

Tempe Canal  
South Side of Salt River  
Tempe, Mesa, and Phoenix  
Maricopa County  
Arizona

HAER No. AZ-16

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ARIZ,  
7- TEMP,  
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record  
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# HISTORIC AMERICAN ENGINEERING RECORD

Tempe Canal  
HAER NO. AZ-16

Location: On the south side of the Salt River in the city limits of Tempe, Mesa and Phoenix, Maricopa County, Arizona.

Date of Construction: Canal construction began in 1871, with extensions through 1887; Tempe Crosscut and Chandler Falls constructed c. 1894; drainage works, pumping plants and canal modifications began c. 1905 and continue to present.

Engineers: Unknown

Present Owner: U.S. Government: administered by Salt River Project.

Present Use: Conveys river, pump and waste water for agricultural and municipal uses.

Significance: The oldest canal in continuous use in the Salt River Valley; site of early hydropower projects; the last independent canal company to join the SRP.

Historian: Fred Andersen, Salt River Project Archives.

Beginning of Non-Indian Settlement in the Salt River Valley

In 1865, Camp McDowell was established at the eastern end of the Salt River Valley as part of a military effort to contain marauding Apache Indians. The army post not only made non-Indian settlement in the valley safe for the first time, it provided an economic reason for farming: the mounted troops needed a local source for hay and grain. In 1868, the first permanent canal in the valley was dug by a small group of settlers led by Jack Swilling. Swilling's Ditch, later known as the Town Ditch and the Salt River Valley Canal, came out of the north bank of the river just south of the Pueblo Grande Indian ruin, and proceeded west and northwest through what would become the early Phoenix townsite, and later, downtown Phoenix. By 1870, the population of Phoenix had grown to 240 persons, farming 1500 acres of land. Other small ditches had been taken out on both sides of the river (see map, p. 73).<sup>1</sup>

Sometime between 1866 and 1870, a Tucson trader named Charles Trumbull Hayden was on a trip to Prescott when he found himself unable to cross the flooding Salt River. While waiting for the river to subside, he climbed a butte by the river in Section 15, Township 1 North, Range 4 East and looked down at the flowing river and flat alluvial

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<sup>1</sup>Geoffrey P. Mawn, "Phoenix, Arizona: Central City of the Southwest, 1870-1920," (Ph.D. dissertation, Arizona State University, 1979), p. 17.

valley. Perhaps he saw Swilling's Ditch coming out of the river a few miles to the west, or perhaps he saw the outlines of ancient Indian canals. The founders' legend of Tempe is that Hayden decided then and there that he would move to this place and establish a water-powered flour mill at the base of the very butte--afterwards known both as Hayden Butte and Tempe Butte--on which he was standing.<sup>2</sup>

At any rate, it was not until November of 1870 that Hayden filed a claim for water rights and land on the south side of the Salt River. There is some uncertainty as to whether the Hayden ditch was the same as the Kirkland-McKinney ditch (probably named for W.H. Kirkland and J.B. McKinney), which some sources believe was dug in 1870 or before. The fact that this ditch would be known alternatively by both names for many years lends credence to the theory that they were one and the same. This ditch became the northern branch of the Tempe Irrigating Canal probably no later than the fall of 1871. J.T. Priest later stated that he bought a share in the Kirkland-McKinney ditch

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<sup>2</sup>This story is told by several historians: Carl Hayden, Charles Trumbull Hayden Pioneer (Arizona Historical Society, Tucson, 1972), pp. 32-33, gives the date as 1866; Christine Lewis, "Early History of the Tempe Canal Company" (Arizona and the West 7, 1965), p. 228) says the date was circa 1868. Others say the date was 1870.

and went to work on the Tempe Canal in the winter of 1871-72.<sup>3</sup>

Meanwhile a small group of farmers had also been attracted to the possibilities of the south bank. On December 6, 1870, at a meeting "on the south bank of the Salt River," the Hardy Irrigating Canal Company was formed by B.W. Hardy, Jack Swilling, J.E. Ingersoll, J.O. Sherman, J.L. Mercer and John Olvaney. In January, the name was changed to Tempe Irrigating Canal Company. This unincorporated association of irrigators would last more than fifty years. The purpose of the company was to take out a canal which would be used for milling, farming, and other purposes. The head of the canal was in the southeast corner of Section 34 (Township 2N, Range 5E) or the northeast corner of section 3 (T1N, R5E), about six to seven miles upstream from the Tempe Buttes (see map p. 73). Twenty thousand miners' inches of water were claimed.<sup>4</sup>

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<sup>3</sup>Jack L. August, Jr., "Carl Hayden and the Politics of Water in the Southwest" (Ph.D. diss., University of New Mexico, 1985), p. 9; Earl Zarbin, "Salt River Valley Canals: 1867-1875" (paper given at Salt River Project, 1980, located at SRP Archives) p. 6; Christine Lewis, "Early History," p. 228; Testimony of J.T. Priest (M. Wormser et al vs Salt River Valley Canal, Third District Court, Maricopa County), p. 228 1/2.

<sup>4</sup>Original Minute Book, Tempe Irrigating Canal Co. (Secretary's Office, Salt River Project), p. 3; A miners' inch is a measurement of flow rather than quantity. A constant flow of one miners' inch for one year produces about eighteen acre feet. The rule of thumb for early Valley irrigators was that 100 miners' inches of flow would  
(Footnote Continued)

### Digging the Canal and Planting Fields

The founding partners each invested \$200 for two shares, and agreed to furnish all tools and provisions for the digging of the canal and building of a dam. Additional shares could be acquired by anyone in exchange for 100 days' labor, and a half-day's extra credit would be awarded for animals brought to the job. From early March to the end of April 1871, a small ditch was dug under the supervision of Captain Nathaniel Sharp (see photo AZ-16-1 and AZ-16-2 for examples of early dam and headgate construction). During this time the meetings of the company directors were held at the construction camp. Water was diverted by a small crib dam, and the entire length of the canal and ditches dug that spring probably was not much more than five miles. On April 28, on a motion by Swilling, work was suspended until July. No more than 300 acres were irrigated that summer in Sections 8, 9, 17, and 18 (T1N, R5E) (see photo AZ-16-9). The following October, bids were solicited for someone to extend the canal to the southern line of Section 19. There is no notation whether such a contract was let.<sup>5</sup>

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(Footnote Continued)

irrigate about 160 acres. Source: Earl Zarbin, "Salt River Valley Canals 1867-1875," p. 1.

<sup>5</sup> Minute Book, Tempe Canal Co. (SRP Secretary's Office), pp. 3-6, 14-15, 19-21; Testimony of J.T. Priest, (M. Wormser et al) p. 354; Argument of Clark Churchill, (M. Wormser et al) p. 9.

The Tempe farmers in these first several years were living on the edge of civilization, and many were also on the bare edge of poverty. Charles Roberts was later asked about the obstacles faced by these prospective homesteaders:

One great obstruction was poverty. The people that built and constructed that canal were very poor . . . if they didn't have the grub a certain portion of the company furnished the grub on the terms that they got the grub while they worked and then worked so much more to pay for the grub . . .

Once the work on the ditch was done, things got even worse:

In fact, after they had the ditch out they lived on beans straight. One of the witnesses testified to that and I know he did because I took supper with him at the time . . . Freights were high and hard to get anything here, and consequently I myself put in barley with brush from a mesquite tree with a couple of horses that I was able to get from the government . . . If a man had a plow a dozen borrowed it . . .

Others had similar experiences. In his first summer, J.T. Priest had to obtain his seed from the Gila River Indian Reservation, and planted with an "Indian plow" (a bent stick). When work on the canal was suspended in April 1871, all the tools and implements of the company were made available to shareholders free of charge, undoubtedly for the purpose of preparing ditches and fields for planting.<sup>6</sup>

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<sup>6</sup>Testimony of Charles Roberts, pp. 1135-1136, Testimony of J.T. Priest, (M. Wormser et al) pp. 229, 242; Minute Book, Tempe Canal Co., pp. 14-15.

Two things which these remembrances make plain are the necessary sense of community among the settlers, and the importance of the company's large shareholders in financing the initial work. The company's founders each acquired two shares at \$100 per share, and had an option to buy up to eight additional shares at that price. All other shares sold for \$200 or for labor. Some of the those with capital invested a great deal in this undeniably speculative venture. During 1871, Swilling bought a total of 23 shares, Hayden bought 17 shares, and C.A. Carpenter acquired 19 shares.<sup>7</sup>

#### Expansion of the Canal System and Acreage: The 1870s

During the winter and spring of 1871-1872, the canal system was expanded considerably, taking on the general proportion that it would maintain for many years. The headgate in the river bed was a wooden structure, 14 feet wide. What the farmers considered the "Tempe Canal proper" was about a mile long, ending in Section 9 (T1N, R5E) at a gate which was 20 feet wide. Extending below this for about a half mile was the "Trunk Ditch," from which most or all of the branch canals diverged. In the early years there were two main branches. The Hayden branch ran southwest from the Trunk Ditch for approximately one and one-half miles, then

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<sup>7</sup>Christine Lewis, "Early History," pp. 229-230.



turned due west to the Tempe Buttes, where it curved around the southern and western slopes to Hayden's Mill before dumping into the river; total length was five to six miles. The Western Branch ran about nine miles from the foot of the Trunk Ditch to the Niels Petersen homestead in Section 29, (T1N R4E). This branch was completed in 1872. These branches were built by the individuals or small groups of farmers who would be served by them, not by the Company. The main canal and Trunk Ditch were built on public lands, and the branches ran through and over the homesteads of the owners. The summer of 1872 the first "permanent" rock and brush dam was built, 100 yards long and five feet high. Like all such dams it had no control works. Excess flow rolled over the top and in a large flood the dam began to give way, so repair and maintenance work was nearly constant. The headgate was built of wooden timbers supported only by earth. The framework was made of timbers one foot square, in which two gates "opened up and down the same as a window" in grooves formed by cleats attached to the framework.<sup>8</sup>

During the winter of 1873-74, a large flood came down the river and washed around the headgate, leaving it standing in the middle of the stream. After that the

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<sup>8</sup>Testimony of J.T. Priest, pp. 229, 301, 304, 324, 325, 333, 352, 354, 355-56, testimony of Niels Petersen (M. Wormser et al), pp. 906, 931-34, 938, 942, 1018-22, 1040; testimony of Thomas Morrow (M. Wormser et al), p. 1443.

headgate was moved "further down, into the cut," and the height of the dam was increased to 7 to 8 feet. Sometime in the 1870s, a second dam was built about a mile above the headgate, the purpose of which was to divert the river into the southern channel toward the lower dam and headgate.

Through the decade additional ditches were built and more acreage came under cultivation. In 1873 the Hayden Branch was widened from 8 to 12 feet in preparation for supplying the Hayden mill, which began taking water in 1874. By 1877, the Carley (or Carley & Beach) Ditch had been dug from the foot of the Trunk Ditch to the west about a mile and a half. It was 5 or 6 feet wide and irrigated 4 or 5 farms. The Spanish Ditch started 1 1/2 miles down the Western Branch and ran to the northwest, crossing the Hayden Branch on a flume. It probably ran to the Mexican settlement, known as San Pablo, located east of Hayden's Ferry in Section 15 (T1N, R4E). The Miller Ditch ran south from the Western Branch about 2 miles to Section 25 (T1N, R4E). The Oury Ditch also branched off the Western and ran about 3 miles to Section 12 (T1S, R4E). It was built in approximately 1876 and was about 8 feet wide at the bottom. The Petersen Ditch, which ran along the southern boundaries of sections 27, 28, and 29 (T1N, R4E), was the longest offshoot of the Western Branch. About a mile north of the Peterson Ditch, the Double Butte Ditch left the Western Branch in Section 25 and ran west to the northern part of Section 29. It was about 8 feet wide, and three to four

miles long. The Morrow Ditch also departed the Western Branch in Section 25, running northwest about four miles to Section 20. These big ditches usually served several farms, narrowing as the water was drawn off by laterals. There were many other small ditches not mentioned here.<sup>9</sup>

The expansion of the ditch system was accompanied by an increase in irrigated acreage. In 1875 the total acreage was between 3500 and 3800 acres. By September of that year, 109 of the original 200 shares of stock in the Tempe Irrigating Canal Company had been subscribed, and the sale of stock was ended. Each share was intended to irrigate one quarter section of land (160 acres). Although 20,000 inches of water had originally been claimed, the canal had a capacity of only about 11,000 inches. Using the rule that 100 inches would irrigate a quarter section, 109 shares would irrigate 10,900 acres. These 109 shares were subdivided, consolidated, sold and exchanged throughout the company's existence. They were also rented. C.A. Carpenter, G.H. Oury, J.L. Mercer, and many other shareholders both large and small farmed little or not at all, selling their water rights on an annual basis. Yet the irrigated acreage continued to grow. During the second half

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<sup>9</sup>Testimony of Thomas Morrow, pp. 1335 1/2, 1342-54, 1362, 1474, 1476, testimony of J.T. Priest (M. Wormser et al), pp. 298, 323, 333, 343, 357.

of the 1870s acreage increased by an average of 1000 acres per year, to approximately 8000 acres in 1879.<sup>10</sup>

Further Expansion and Development of Works: The 1880s

In the 1880s, a southern branch of the canal was dug. Construction may have begun as early as 1878, or it may have been an expansion of a smaller ditch, but it was definitely a major branch of the system by 1887, 20 feet wide and supplying both the Wormser and Kyrene extensions. The southern branch is the major part of the canal to survive into the modern period. It terminated in Section 12 (T1S, R4E), where it split into four branches. The Wormser extension ran due west along the southern borders of sections 1, 2, and 3, then turned northwest, following the contour of the land along the northern slopes of the Salt River (South) Mountains for another ten miles. Three ditches, the Great Eastern, Jones and Goodwin, continued to the south, with the Kyrene Extension taking out of the Goodwin about one half mile south of the Wormser. The Kyrene ran west, then followed the contour of the mountain range to the southeast, with an ultimate length of some

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<sup>10</sup>Argument of Clark Churchill, p. 15; Testimony of Niels Petersen (M. Wormser et al), pp. 975, 983.

eight miles, ending near the boundary of the Gila River Indian Reservation.<sup>11</sup>

The system also contained two waste gates, both off the Hayden branch. The first turned out of the ditch about five miles below the main canal, east of the buttes. The second ran into the river below the tail race of Hayden's mill. Sometime after 1872 the water from Hayden's ditch was delivered to the head of the San Francisco Canal and became the main supply for that canal.<sup>12</sup>

The Tempe Canal was widened to 30 feet in 1886. The purpose of this was to reduce dam rebuilding. The wider mouth allowed a three-foot high dam to divert as much water as the previous seven foot dam. It was hoped the shorter dam would be less likely to wash out. Dam maintenance was a constant concern. The dam washed out in any big flood, often several times a year, and had to be rebuilt by Company farmers.<sup>13</sup>

Another type of dam maintenance became necessary in the 1880s. As more dams were built upstream, the flow of the river diminished. The Tempe farmers tried to capture all

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<sup>11</sup>Testimony of Niels Petersen (M. Wormser et al), pp. 958-60; "Report Jay D. Stannard on Tempe Canal Property," May 12, 1909 (Salt River Project Archives (SRPA), Control 1596.

<sup>12</sup>Testimony of Thomas Morrow (M. Wormser et al), p. 1456.

<sup>13</sup>Testimony of Niels Petersen (M. Wormser et al), p. 907.

the available flow by packing the upstream face of the dam with hay and manure to try to capture more of the reduced flow during the critical late spring and early summer months. The dam was tight enough, according to James Carroll, that one could cross the river in shoes below the dam "without wetting the inside of them."<sup>14</sup>

Thus by the mid-1880s the basic system had been built and the expansion of irrigable land had leveled off at between 8000 and 10,000 acres. The settlement around the buttes had grown from a few scattered camps to a small town known as Hayden's Ferry until 1879, and as Tempe after that; the town was, in a sense, named after the canal, which had adopted the name Tempe in 1871. Having subdued the environment to some degree, the farmer/citizens of Tempe next faced challenges which grew out of the growing settlement of the valley, and the increasingly complex legal and technological problems this caused.

#### The Kibbey Decree

In the years after 1870, numerous other diversion dams and canals were built on the river, many of them above the Tempe heading. The prevailing custom for obtaining irrigation water was based on the concept of priority rights. Under this system, a diverter could appropriate

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<sup>14</sup>Testimony of James Carroll (M. Wormser et al), pp. 1211-1214.

from the river as much water as he needed to grow his crops or use for some other purpose, such as running a mine or a water wheel. Diverters were supposed to be ranked by date of appropriation, so that in times of shortage, the earliest appropriators were assured that they would have first claim on any water in the river. Thus the water rights of the Tempe farmers should have been extremely valuable, since their 1870 appropriation was preceded only by the appropriations of the Salt River and Maricopa Canals in Phoenix (these were branches of the Swilling Ditch). However, in the 1880s the appropriation system had not been codified into a legally binding system of water distribution. Water appropriations were posted on river banks and in the county recorder's office, but there was no system for enforcing the claims, and no accurate way of measuring the water in the river, so upstream diverters tended to take as much water as they needed, without regard for superior rights downstream.

As upstream diversions increased in the 1880s, many of the downstream diverters began to feel that their water supply was being pre-empted by junior appropriators upstream. This sentiment became especially keen after the Arizona Canal Company made a claim for 50,000 inches of water and built a diversion dam above all the other dams at Granite Reef. In February 1887, most of the canal companies joined in a suit to prevent the Arizona Canal Company from diverting their claimed water. Over the next three years

the Arizona Canal Company bought controlling interest in each of the northside canal companies, and most of the southside companies dropped out as plaintiffs. By the time the trial began in March 1890, only the Tempe Canal Company and Michael Wormser (sole owner of the San Francisco Canal and a major stockholder in the Tempe Canal) were left as plaintiffs, while all the other companies had become defendants. The case is therefore known as M. Wormser et al v. Salt River Valley Canal Company et al. The case was heard by Judge Joseph H. Kibbey in the Third Judicial District Court, Maricopa County. The decision was rendered in April 1892, and the accompanying decree was made in October 1892.

This was the first important water rights case in Arizona, as it established most of the critical principles of the state's water law. First, Judge Kibbey held that only owners and occupants of land were entitled to appropriate water, and a right could only be established by appropriation and use of water on the land. Second, he upheld the custom of priority of rights based on date of appropriation and more or less continuous use. Third, he decided that canal companies were common carriers of water and could not themselves own water or water rights, and that the sale of water was not a use of water. Fourth, Kibbey held that the right of appropriation of water was permanently appurtenant to the land which it irrigated, and



that the ownership of stock in a canal did not in itself amount to a water right.

Despite the importance of the legal principles established, the Kibbey Decree had only one immediate effect on water distribution in the valley. This was to assure the water supply of the Tempe and San Francisco canals as against all the other major canals. Before the decree had even been entered, all the defendant companies had entered into a contract to share and divide all the water not required for the Tempe and San Francisco canals. Thus the principal function of the court water commissioner appointed by Kibbey was to designate the supply for these two canals. The Tempe Canal was assured of a water supply for 117 quarter-sections in times of plentiful supply, and 95 quarter-sections had an appropriation date prior to 1885, when the first appropriations under the Arizona Canal were recognized. That this system did not work to the detriment of the Tempe Canal may be inferred from the assertions of a contemporary observer that the contract dividing the waters among the other canals "does not represent the wish of the majority of the water users under the older canals," and was the "cause of much litigation." Meanwhile, the operating conditions of the Tempe Canal during the 1890s were described as being "as satisfactory as under any large canal

of the Valley, and much more satisfactory than under most of the other canals."<sup>15</sup>

The suit against the other canal companies was the first of several actions which differentiated the Tempe Canal from the rest of the valley irrigation system. For the next thirty years the shareholders of the Tempe Canal Company would consistently operate in independent fashion, asserting their own concerns and jealously protecting their rights while most of the valley farmers increased the level of their cooperation and formed the Salt River Valley Water Users Association. This assertion of independence is the most important theme related to the Tempe Canal in this period.

#### The Chandler Falls Power Plant

In March 1892, the Consolidated Canal Company was incorporated by A.J. Chandler and partners to deliver water to his ranch south of Mesa, where he planned to develop a town and farmlands. Under contract with the Mesa Canal, the Consolidated Canal Company enlarged the Mesa Canal and rebuilt the headworks, then extended the eastern branch south toward the Chandler lands. However, the late priority date of these lands made the water supply from the river

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<sup>15</sup> Alfred J. McClatchie, "Utilizing Our Water Supply" (University of Arizona Agricultural Experiment Station Bulletin No. 43, 1902), pp. 82-89, 92.

uncertain, so Chandler planned to increase the supply through pumping groundwater beneath his lands. To obtain electricity for pumping, the company built a division gate on its canal just above the southern boundary of Section 11 (T1N, R5E) which could divert enough water to supply the Tempe Canal (see photo AZ-16-5). The water ran through a crosscut canal approximately two miles due west to intersect the Tempe Canal in Section 9 (see photo AZ-16-6). Before joining the Tempe Canal the water dropped off a mesa some 35 feet (see photos AZ-16-7, AZ-16-8). A hydropower turbine at this point was to generate the electricity which would be transmitted to the Chandler lands. Because of the very early priority date of the Tempe water, a continuous flow was much more likely.<sup>16</sup>

The Consolidated Canal Company was apparently unable to reach agreement with the Tempe Canal for this use of its water, but proceeded with its plans. When the bank of the Tempe Canal was breached in June of 1892, and water turned in from the crosscut, the Tempe Canal Company obtained an injunction in district court to prevent this use of its water, describing it as a trespass on canal property, a blocking of their main canal, and an "unskillful" joining which threatened the reliability of supply. However, in the case of Austin v. Chandler (1895), the Arizona Supreme Court

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<sup>16</sup>Sylvia Lee Bender-Lamb, "Chandler, Arizona" (M.A. thesis, Arizona State University, 1983) pp. 24-26.

reversed the district court to rule that this use of the water did not interfere with the rights of the Tempe farmers, as long as the water was conveyed to their canal above the ditch heading of the first user.<sup>17</sup>

Although Tempe farmers apparently obstructed the interconnection even after the State Supreme Court decree in November 1895, the Chandler Falls plant was an advanced concept for the Salt River Valley at this period. Within three years the plant was providing power to street lights, homes and shops in Mesa and Tempe. Persistent drought in the late 1890s meant that even the Tempe Canal with its venerable water rights was frequently dry, so Chandler built an oil-fired steam generator at the Falls site to provide improved reliability, although power from this plant was much more expensive than hydropower. By 1901, Chandler had completed construction of transmission lines to his lands and began installing wells which eventually irrigated several thousand acres. In 1908 the federal government acquired the Tempe Crosscut and substantially all the features of the Chandler Falls site, except the powerhouse itself. The federal government purchased the powerhouse in 1916 and rebuilt the plant in 1919 (see photo AZ-16-3).<sup>18</sup>

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<sup>17</sup>Brief of Appellees, Austin v. Chandler (Arizona Supreme Court, 1894), p. 22.

<sup>18</sup>Mesa Free Press, August 9, 1895, February 22, 1896; Bender-Lamb, "Chandler, Arizona," pp. 28, 29, 31.

The objections of the Tempe farmers--that debris would come down the falls, that the rush of water would blow out the banks of their canal--were spurious and short-sighted. But the opposition of the Tempe farmers fit the emerging pattern of independence bordering on intransigence, and stubborn defense of their water rights. Despite the superior water delivery through the crosscut, the Tempe Canal Company would maintain its original headworks and trunk canal to capture flood flows as long as the company existed. The trunk canal from the riverbed continued to be represented on maps into the 1930s, and is clearly visible in the 1934 aerial photos (see photo AZ-16-20).

#### Formation of SRVWUA

By the late 1890s, the use of irrigation had reached the limit of its expansion using the existing methods of diversion by crib and rock dams. In addition, a pernicious drought was demonstrating that dependence on the natural flow of the Salt was a risky proposition. The answer to both problems was water storage and river regulation by means of a major dam located in the canyons on the upper Salt. The Tonto damsite had been known since 1889, but in the following decade valley residents and private capitalists were unable to devise a means whereby either local or eastern investors could be persuaded to finance such a speculative investment. However, the national reclamation movement was gaining momentum through this

period, and in June of 1902, the passage of the Reclamation Act made it possible for the federal government to finance and build major water storage and distribution projects.

In August and September of 1902, the farmers of the Salt River Valley formed a Water Storage Committee to negotiate with the Interior Department, and to push for the early approval of the Tonto dam. The Water Storage Committee named Judge Joseph Kibbey to write articles of incorporation with the help of national reclamation advocate George Maxwell. When the draft articles were presented to the executive committee charged with passing them on to the full Water Storage Committee, serious disputes arose over some of the provisions. When the full Committee met January 17, 1903, the majority report on the draft articles of incorporation recommended approval. But a minority report which was read at the meeting indicated that the controversy on the executive committee had not been solved. The three signatories of the minority report were Ethelbert Wilbur of the Mesa Canal, James W. Woolf of the Tempe Canal, and Dwight B. Heard, successor to the Wormser interests in the San Francisco Canal, and a large stockholder in the Tempe Canal. Minority members offered a number of amendments to the articles, which were rejected, and the articles were

adopted on January 21, 1903 as written by Kibbey and Maxwell.<sup>19</sup>

The key principle of the minority opposition was the desire to maintain independence and autonomy of the existing canal companies. The minority report suggested that each canal form a division in the new association with its own three-man board of water commissioners. This board would both operate the canal and collect assessments. Most important, improvements in each division would be paid for only by the members of that division, and prior rights under the older canals would be protected from dilution. The minority position reflected the concerns of many of the older water rights holders in the valley, which of course included the Tempe farmers. These farmers were essentially satisfied with the water delivery system and feared any expansion of irrigated acreage would lead to a reduction of the amount of water available for prior appropriators. They also felt that their well-established and very valuable farms would be the principal security for the project, while

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<sup>19</sup>Earl Zarbin, "Dwight B. Heard: 'A Public Enemy'" (manuscript, n.d., SRPA), pp. 4-7. The organization was known as the Salt River Valley Water Users Association (SRVWUA); the dam, canals and allied features, known as the Salt River Project were built by the U.S. Reclamation Service (USRS), and operated by them until 1917, when the SRVWUA took over operating responsibility. Title to the system remains in the U.S.

land speculators and new homesteaders would be the principal beneficiaries.<sup>20</sup>

The minority interests tried repeatedly to impress their demands on the Secretary of Interior and representatives of the Reclamation Service (USRS), but were told that any changes in the articles would have to come from the Water Users Association. As part of this effort, Heard's business partner Adolphus C. Bartlett expressed, in a letter to an associate, some of the reasons why the minority was so strongly opposed to the articles. The primary reasons were economic. Farmers under the Tempe Canal were paying about fifty cents per acre per year for water, while "less favored" areas of the valley paid three times that much. And there was resentment against Maxwell, who had been brought to the valley as an expert in reclamation law, and who the minority saw as the principal person responsible for overriding the district system. Maxwell, wrote Bartlett, had set himself up as a stand-in for the Secretary of Interior:

His oft repeated question from the platform has been "Do you want water storage? If, so you must do thus and so, or, in my opinion, the Secretary will never build the reservoir." . . . Every one wants water storage at all hazards and a majority of the Committee has been secured for the present Articles by this "whipping in" process. Mr. Maxwell's talk from the platform to

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<sup>20</sup>Phoenix Enterprise, February 10, 1903; Minority Report, Salt River Valley Water Storage Committee, and Amendments Offered by the Minority of Salt River Valley Water Storage Conference Committee in Support of Their Report, January 17, 1903 (SRPA Control 150.23).



business men of Phoenix has been "Here are two and a quarter millions of dollars do you want that sum expended among you?"<sup>21</sup>

For the next several months, as the association was trying to sign up farmers, the Tempe farmers continued to try to carry the minority arguments to the Secretary of Interior. For these efforts the company, and especially Bartlett and Heard, were alternately vilified and cajoled by valley civic leaders and editorialists. But the Tempe landowners were pursuing an independent course to assure their water supply. On May 30, Tempe Canal shareholders approved a petition seeking to have its water stored in the reservoir and distributed to them when needed, and even to join the Water Users Association, if the Secretary agreed to the conditions which had already been rejected. Several weeks later they attempted unsuccessfully to file on a power site on the upper Salt (in the vicinity of Mormon Flat), the idea being that hydropower could be generated to run pumping plants in the Tempe district as an alternative to the reservoir.<sup>22</sup>

When the signup deadline passed on July 13, 1903, only a few of the Tempe farmers had joined the Association (the

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<sup>21</sup>Bartlett to Kohlsaas, February 16, 1903, SRPA, Control 160.

<sup>22</sup>Arizona Republican, May 31, 1903; July 11, 1903; Arizona Gazette, June 30, 1903. The power venture failed because all public lands along the river had been withdrawn from entry to prevent interference with the Tonto Project.

Mesa and Utah canal companies also declined to join the Association). The Tempe farmers were immediately forgotten in the excitement over the beginning of dam construction, but the mutual resentment of the Tempe Canal company and the Water Users Association would color the relationship between the groups for years to come. Perhaps the popular view of Tempe was best shown in the story about a streetcorner conversation between Al Williams of Phoenix and J.C. Goodwin of Tempe. After a discussion of the different irrigation strategies of the two towns, Williams opined that Tempe was a "nice little town, surely,

But somehow I have always wondered why it was that the town having all the natural advantages in the world, the best canal systems, the most water, the commercial center in the early days . . . why it is that Tempe is still a little country town of 2,000 inhabitants including the Normal School Students, while Phoenix has become a city of ten or fifteen thousand?"

"Oh, that's easily explained," replied Mr. Goodwin.

"You see we have on the south side a lot of old fogies who don't know enough to take advantage of their opportunities, have no faith in the future and refuse to turn a dollar loose to build up the town."

"Oh, I see," said Mr. Williams, and while everybody else was laughing Mr. Goodwin remarked that he didn't see where the joke came in.<sup>23</sup>

#### The Kent Decree

During the construction of Tonto (later Theodore Roosevelt) Dam, many parallel activities were undertaken to prepare the valley for operation of the irrigation project. The most important of these activities was the adjudication

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<sup>23</sup>Arizona Republican, June 25, 1903.

of water rights for almost all the land in the valley as a result of a lawsuit known as Hurley v. Abbott. The Tempe Canal Company filed motions early in the trial attempting to obtain a separate trial and a change of venue, which were denied. Otherwise, the company played little role in the adjudication. The Kent Decree of March 1, 1910, reaffirmed the Kibbey Decree principle that water rights were appurtenant to land: "The right to appropriate is a right that belongs to the land owner, but the water appropriated is appropriated for the land . . . and its use belongs to the land and not to the appropriator." The irrigable lands of the valley were divided into three classes. Class A lands were those which had been irrigated before 1903, and up to 1909. Class B lands were those which had been irrigated prior to 1903, but not between 1903 and 1909. Class C lands were those which had never been irrigated, but which were under a canal and could be irrigated by the stored water of the reservoir. Of the lands under the the Tempe Canal, 24,380 acres were decreed to have Class A rights, that is, rights to the normal flow of the river, or water that would have come down the river if there were no storage dam. Class B rights were given to 1,045 acres, which meant that these lands had a right to surplus flow of the river. Thus, the Kent Decree reaffirmed early appropriation dates of almost all the lands under the Tempe Canal, and though the duty of water to the lands was somewhat reduced (from 64 to 48 miners' inches per quarter

section), the government and the water commissioner were instructed to ensure that the water for Tempe would continue to flow down the river and through the Consolidated Canal just as it had before the decree.<sup>24</sup>

### Parallel Canals

1910 also saw the beginning of another attempt to join the Tempe Canal to the SRP system. The primary purposes of those Tempe landowners who wanted to join were to obtain storage water rights from the reservoir, and to obtain government resources for drainage of their lands, which were becoming waterlogged. The landowners met with Project Engineer Louis C. Hill several times to explore the possibilities. After the meetings Hill estimated that 17,000 of the approximately 24,000 acres in the district would vote to come into the Water Users' Association, and that the remainder would be willing to buy water through government canals for a fee of \$1.80 per acre. He proposed to the Secretary of Interior that the entire Tempe system be purchased for \$156,800.<sup>25</sup>

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<sup>24</sup>"Decision and Decree," Hurley v. Abbott (Third District Court, Maricopa County, 1910), pp. 10, 11, 16-18; Mildred Christine Lewis, "A History of Irrigation in the Tempe Area" (M.A. thesis, Arizona State University, 1963), pp. 88-91.

<sup>25</sup>Arizona Republican, April 17, 1910, June 13, 1910; Earl Zarbin, Roosevelt Dam: A History to 1911, p. 230.

However, there were two factors which caused many Tempeans to question this proposal. First, their current irrigation costs were remarkably low. In the 1910 fiscal year, the Tempe Irrigating Canal Company served 22,510 acres for a total assessment of \$8696, or about forty cents per acre. Second, there was adamant opposition of many, if not most shareholders to joining the government system. All the shareholders knew that some of their neighbors would never sell their interest to the government, and that the government would insist on complete ownership.<sup>26</sup>

In the end, the U.S. was unable to reach agreement with the Tempe Canal for the use of its canals, although individual farmers were free to give up their Tempe Canal shares and receive stored water if there was any feasible means of conveying it to their land. Late in that year, Hill made an offer to buy the Wormser branch alone. This canal extended from the Southern Branch of the Tempe Canal along the section line between Section 1 and Section 12 (T2S, R4E) and ran west approximately two and one half miles before turning north and west another ten miles along the base of the Salt River Mountains. The government plan was to dig a feeder from the Consolidated Canal in Mesa west to where it would join the Wormser. In December, the owners of the Wormser (under the Tempe Canal, the branches were owned

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<sup>26</sup>Arizona Republican, July 26, 1910; Arizona Gazette, July 26, 1910.

by the farmers they served) made a counter-offer that they retain the canal but allow the government to expand it to carry Association water.<sup>27</sup>

Instead, the government began surveying a parallel canal in February 1911. During the spring of 1911 the government canal was dug from both ends toward Tempe, with the south Phoenix section parallel to the Wormser. Meanwhile the Reclamation Service continued negotiations to purchase the Kyrene Branch (also known as the Orange Belt Canal) of the Tempe Canal, which ran parallel to and one half mile south of the Wormser Branch until it turned south and west to water south Tempe lands. Finally, when the Reclamation Service was unable to secure the purchase of the Kyrene, it condemned a right of way on the north side of the Kyrene and piped under the Southern Branch of the Tempe Canal into the parallel canal, which became known as the Western Canal for its entire length.<sup>28</sup>

The reasons why the Reclamation Service and the branch canals were unable to come to an agreement are unknown. The reported offer of approxiamtely ten thousand dollars for the Wormser did not sway its owners, whether because the amount was considered severely inadequate or because the farmers

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<sup>27</sup>Arizona Republican, July 13, 1910; July 20, 1910; December 23, 1910; December 30, 1910.

<sup>28</sup>Arizona Republican, February 4, 1911; February 11, 1911; June 25, 1911; July 6, 1911; July 25, 1911.

for some reason feared the loss of ownership of their canal system. The Kyrene owners were initially favorable to selling the branch, but then redrew the proposed deed adding provisions which caused Hill to recommend against its acceptance. But the decision not to enter into the branch canals on any basis except sole ownership was apparently made in Washington. Hill knew that to construct the canal across the low-lying lands of south Tempe would involve constructing a ditch "high out of the ground," and urged the director of the Reclamation Service to "exhaust every means to acquire possession of these canals, or either of them, rather than be compelled to build a new ditch in this locality." He proposed that the government could purchase a majority of the stock in the branch canals without taking sole possession. However, the government declined, and the construction of this section of the Western Canal was difficult, as Hill had foreseen. It was necessary to build up the banks to seven and one half feet above ground level, the dirt being taken from a borrow pit on the north side of the right of way: "This soon exposed the borrow pit to the seepage water which in this district lies near the surface and soon converted the pit into one great mud hole in which the horses would sink up to or above the knees."<sup>29</sup>

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<sup>29</sup>Arizona Republican, December 23, 1910; Hill to the Director, U.S. Reclamation Service (SRP, Land Department, file 2423); "History of the Project for the Calendar Year 1912" (SRPA Library).

### Pumping and Drainage

The mud pit along the Western Canal was indicative of the water problem which would finally drive the Tempe Canal Company into the Salt River Project; ironically, it was not a problem of lack of water, but of excess water. The Kent Decree recertified the early priority of the Tempe water rights, while the Project's Granite Reef diversion dam, and the regulatory action of Roosevelt Dam brought a new level of assurance to the delivery of Tempe water. After the building of the Western Canal, the operating relationship between the Reclamation Service and the canal company was smooth, and was unaffected by the transfer of Project operations to the Salt River Valley Water Users' Association in 1917. But as the Project increased the irrigable area of the valley, the rising water table became an increasing threat to both Tempe and Association farmers. Despite the fact that both the Tempe Canal Company and the Salt River Project pumped water to increase their irrigated acreage, or as a backup supply to river water, thousands of acres were so poorly drained that salts and alkali were not being leached out of the root zone. Eventually such land would be unfit for any farming activity.

The geology of the Salt River Valley is generally that of a deep alluvial fill, through which flows a substantial underground river. When the lands on either side of the river are irrigated, the size of this underground flow is augmented by return flow of the irrigation. The flow of



this underground river is constricted by an underground ridge extending across the middle of the valley from the eastern end of the Salt River Mountains north to Camelback Mountain, which breaks the surface in the Double Buttes and Tempe Butte, as well as the Papago Buttes north of the river. The ponding affect of this ridge in the Tempe area was the reason why Tempe lands were the first affected by waterlogging when extensive irrigation in the east valley caused the water table to rise nearly to the surface.<sup>30</sup>

In 1905 the members of the Tempe Canal built a battery of pumps along the Hayden branch in the northwest corner of Section 24 (T1N, R4E). The battery consisted of ten pumps, each sixteen inches in diameter and 200 feet deep. They operated by means of a branching ten-inch suction pipe which was inserted into the top thirty feet of each well. A single Byron Jackson 750 rpm pump provided suction to the system, which fed a forty-two inch steel discharge pipe that dumped into a concrete flume. Power was provided by a Murray Corliss tandem compound engine of 250 horsepower, driven by two Kewanee boilers. The entire plant cost \$56,000, and produced 1100 miners' inches of water. The company also owned a smaller pumping plant, known as Heard's Pump, located in the southeast corner of section 30. This

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<sup>30</sup>For an extensive discussion of the hydrology of the valley, see Willis T. Lee, Underground Waters of the Salt River Valley, Arizona (U.S. Geological Survey, Water Supply and Irrigation Paper No. 136, 1905).

plant consisted of six wells of eighteen inch diameter, 100 feet deep, also operated by a single suction pump. These pumps were installed to supplement the supply of river water. More significantly, the two pumping plants represented a possible solution to the drainage problem, but this solution was ignored by the Tempe farmers.<sup>31</sup>

By 1910, the drainage problem had become serious enough to elicit an inquiry from a representative of the Tempe Canal as to the legality under territorial law of setting up a bonding district for drainage. By 1912, with statehood achieved and a drainage district law on the books, an attempt was made to establish a drainage district which substantially overlaid the Tempe Canal Company lands. Although this organization was not authorized, a subsequent attempt to form a drainage district in the Tempe Canal territory was authorized in an election on October 3, 1914.<sup>32</sup>

The District had two alternative methods to drain the lands. The more expensive method was to drill wells, which would have made it possible to lower the water table to any desired level, and would have created enough water to

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<sup>31</sup>Memorandum of H.J. Lawson, March 1, 1923, SRP Central Records file 71-14-1, SRPA.

<sup>32</sup>Frankenburg to Cameron, March 7, 1910 (SRPA Control 140.3); Mildred Christine Lewis, "History of Irrigation," pp. 93-115, covers the formation of the Drainage District in detail.

irrigate 3000 to 5000 acres of land, by one estimate. The facility of this method was already being demonstrated by the Tempe Pumping Plant, where the battery of pumps had lowered the water table over an area one mile in diameter.<sup>33</sup>

However, the District chose to drain the land by digging a seepage ditch which would drain the water off toward the Gila River Reservation. Individual land owners bore the responsibility of installing perforated tile drains under their farm units, at a cost estimated at \$15 per acre. The main ditch, begun in February 1916, commenced in the northwest corner of Section 35 (T1N, R4E), and ran south to Section 23 (T1S, R4E), then southwest to Section 5 (T2S, R4E) on the Gila River Indian Reservation. At that point it was delivered under contract to Lincoln Fowler who had leased a 2500 acre farm from the reservation agent.<sup>34</sup>

An unusual feature of the drain was that it crossed from the Salt River watershed into that of the Gila River. This factor, combined with the failure to use pumps, ensured the failure of the project. At its upper end, the ditch was six feet deep, which increased to fifteen feet as it crossed the watershed, but there was still virtually no flow from the upper end, where the water "was about 3 feet deep but

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<sup>33</sup>C.R. Olberg to W.M. Reed, October 1913, (SRPA Control 140.3).

<sup>34</sup>C.A. Engle to C.R. Olberg, July 29, 1913 (SRPA Control 140.3); Mildred Christine Lewis, "A History of Irrigation," p. 110.

had no perceptible velocity. Water was standing in the fields and along the road near the ditch, indicating that the drainage was poor."<sup>35</sup>

By 1920, the water table in Tempe had not declined significantly, if at all. A SRVWUA report on groundwater and drainage showed the average depth to groundwater in the Tempe Canal area was less than 10 feet. The same drainage report officially recognized that "any attempt at lowering ground water over individual areas or small portions of the project will not . . . prove satisfactory."<sup>36</sup>

#### Joining the Salt River Project

It is probably incorrect to say that the idea of the Tempe Canal Company joining the Project began at any particular time. It had been a topic of discussion and attempts at negotiation ever since the company's initial refusal to join the Water Users' Association in 1903. By late 1919, however, the idea of joining the systems had at least reached the point where the two organizations were holding meetings and exchanging correspondence on the subject. While the tone of the exchanges sometimes suggested that there were still some serious differences, in

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<sup>35</sup>C.R. Olberg, "Report on Proposed Main Ditch, Drainage District No. One," letter to Commissioner of Indian Affairs, March 15, 1920 (SRPA Control 140.3).

<sup>36</sup>"Drainage Report," Salt River Valley Water Users, Association, 1919, p. 10 (SRPA Control 430.2).

fact negotiations proceeded rather smoothly. In December of 1919, J.M. Wilkinson, president of SRVWUA wrote to E.W. Hudson, chairman of a Tempe Canal committee on consolidation, that "we do not seem to be very far apart in our views unless it be on the question of making immediate compensation to you for (your) irrigation and drainage works." The Association was not in any position to pay for the property in cash, said Wilkinson, but would allow the Tempe farmers credit against the Project construction assessments they would be paying as Association members. The next month an Association committee on the merger proposed three basic principles for an agreement. First, 90 per cent or more of the Tempe shareholders must join the Association, and they would be on equal terms with current members. Second, all back assessments on the Tempe lands must be paid. Third, Tempe shareholders would be allowed fair value for the "physical property" that was taken over for use by SRP, the value to be determined by a three man board of engineers.<sup>37</sup>

The primary interest of the Tempe landowners was to secure drainage for their lands, so they insisted that their back assessment payments be used to help pay for drainage pumping in the Tempe area, while the Association committee

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<sup>37</sup>Wilkinson to Hudson, December 13, 1919; Chairman Ex-Officio to Hudson, January 13, 1920, Legal Files, Secretary's Office, Salt River Project (hereafter Legal Files).

wanted no strings attached to the use of the money. This issue was resolved when the Association membership voted in an April 1920 election to assess themselves \$2.04 per acre to construct a drainage pumping system on the Project, and another \$1.80 to construct waste ditches. Thus, if Tempe joined the Project they would immediately begin to benefit from the drainage program.<sup>38</sup>

However, something else happened in that election which set back the merger of the two systems, for perhaps as long as another two years. This was the defeat of the incumbent Association president, F. M. Wilkinson, by F. A. Reid. There are some indirect indications that Reid's election was based on the issue of efficient operation of the Project, but there was no reporting either in SRVWUA documents or the newspapers of the time of such an issue in the election. At any rate, the farmers of the Salt River Project, profoundly affected by the postwar depression, were falling behind in their assessments. As a result, the Association was facing a shrinking budget and the danger of defaulting on its construction repayments to the federal government.

For whatever reason, Reid, upon taking office, immediately abrogated the previous understanding by insisting that Tempe entry into the Project would be on terms of no compensation whatever for the canal company's

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<sup>38</sup>Hudson to Wilkinson, February 23, 1920, Legal Files; Arizona Republic March 31, 1920.

property, either in cash or in credit against assessments. In a June 1920, letter, he quoted the terms of contracts which the Association was negotiating with the Auxiliary Eastern Irrigation District and the Paradise Verde Irrigation District as examples of lands coming into the Project without compensation. He concluded the letter by saying that if the Tempeans cared to continue negotiations (on those terms) the Association would do so.<sup>39</sup>

Hudson replied immediately that he did not see the relevance of the examples cited, since they were both outside the Project boundaries, and were both prospective projects with no water rights or existing facilities, whereas the Tempe lands were in the middle of the Project, had highly developed facilities, and good water rights. He called attention to the fact that all the other developed canal companies that had joined the Association had been compensated in some way. Ten days later, Reid responded that the major item of compensation was not negotiable, and that until such time as the Tempe Canal Company was prepared to concede that point, "I do not think it would be advisable to go any further with it."<sup>40</sup>

The Tempe company must have been nonplussed at this turn of affairs, for they did not reply to Reid's ultimatum

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<sup>39</sup>President to Hudson, June 28, 1920, Legal Files.

<sup>40</sup>Hudson to Reid, July 2, 1920; Reid to Hudson, July 12, 1920, Legal Files.

for fully three months. After the shareholders met in October, Hudson wrote that they were prepared to enter the Project on the terms previously outlined, but would not enter without compensation. And there the matter died. There can be no doubt that Reid's actions constituted a summary repudiation of the previously negotiated understanding, but whether the reasons were economic, ideological or personal is unknown. Certainly they fit the established pattern of unnegotiable principles and stubborn rhetoric that had characterized relations between the two companies over the years.<sup>41</sup>

No further action took place on the merger of the two systems until July 1922, when the SRVWUA Board of Governors passed a resolution that "all negotiations with the Tempe Canal Company shall be carried on with the understanding that the Tempe Canal District shall be admitted to the Salt River Project on the same basis as the present shareholders of this Association." While this was essentially identical to a resolution passed in the spring of 1920, it indicated that the merger idea had returned to the fore.<sup>42</sup>

Drainage continued to be the outstanding motivation for both parties. During the wet winter of 1921-1922, an alarming rise in the water table on the south side of the

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<sup>41</sup>Hudson to Reid, October 11, 1920, Legal Files.

<sup>42</sup>Salt River Valley Water Users Association, Board of Governors' Minutes, Vol. 6, p. 1543, July 26, 1922 (SRPA).



river was attributed to over-watering by Tempe farmers, who had been "dumping water into their land all winter." This caused a rise in the water table in Project lands in Mesa, and it may have been the reaffirmation of the need for a regional solution to the groundwater problem that led to the new negotiations. By August 1922, the general principles of an agreement had been approved by the leaders of both organizations.<sup>43</sup>

The mechanism for the merger was the creation of an Agricultural Improvement District which would take over all the works and properties of the Tempe Irrigating Canal Company and Drainage Districts No. One and Two, the power plant of the Hayden Mill, and the Tempe and Heard pumping plants. The Agricultural Improvement District would convey these properties to the United States, and would be operated by the Association. Thereafter the District would issue bonds to finance the building of a drainage system for the Tempe lands. Through the fall and winter of 1922-1923 negotiations continued on the fine points. On June 16, 1923, the presidents of both organizations signed the contract whereby the Tempe Irrigating Canal Company went out of existence, and the canal which it had built in 1870 and jealously guarded over the succeeding fifty-three years

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<sup>43</sup>C.C. Cragin to D.W. Murphy, August 4, 1922, SRPA, Secretary's Boxes, General Contents.

passed to the ownership of the federal government and the management of the Salt River Valley Water Users Association. The Tempe landowners were assured in their water rights, and would benefit from the Association drainage program and from the increased financial stability of belonging to the larger project. The Tempe Canal owners were required to pay \$25 per acre in back construction assessments, but these were spread out over a thirty year period. They were also vindicated in their dispute with Reid over credit for their property, receiving credits up to \$100,196 for the canal system, pumping plants and other properties. Hydropower generation at Hayden Mill was ended, and the mill signed a contract to buy power from the Association.<sup>44</sup>

#### The Tempe Canal in the Salt River Project

The Tempe farmers did not simply recede into the background however. In 1924, the extended wet period which had aggravated drainage problems was succeeded by an extended dry period. In 1925, Association landowners voted overwhelmingly to begin using drainage water for irrigation. Previously, it had been sold to off-project users or run back into the river. Because the Tempe area was among those with the worst drainage problems, and because it was not economically feasible to transport drainage water for long

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<sup>44</sup>Tempe Contract, June 16, 1923, SRPA Control 410.9.

distances across the Project, Tempe lands began to receive a large proportion of the drainage water as irrigation water. There was at that time a strong prejudice among farmers that pumped water was inferior to river water, and the Tempe farmers began to feel that their natural flow water rights were being subverted by the substitution of pumped water. They began to complain of this, and in the face of their threats, their payments of back assessments were postponed for several years. The Association and the Tempe landowners were unable to reach a compromise, and in September 1934, a group of 106 Tempe landowners representing 10,000 acres sued the Association, seeking to be assured delivery of river water, and to limit the pumping of their lands to that necessary for drainage.<sup>45</sup>

The suit was resolved in favor of the Association. The decision stated that the Association was the best judge of how to operate the Project, and could make necessary adjustments to the irrigation system within the limitations imposed by the location and condition of each area of land it served. For example, while pumped water was probably inferior to river water, this deficiency could be corrected by increasing the amount of water in each irrigation application, to wash any excess salts out of the soil. Furthermore, other Project lands received no benefit from

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<sup>45</sup>Orme to Mead, September 29, 1934, SRPA Control 110.5.

drainage pumping which saved the Tempe lands from ruin, but all lands in the Project paid for it equally.<sup>46</sup>

The decision was appealed to the Arizona Supreme Court, where it was affirmed in 1939. From that date it may be said that the Tempe landowners, as well as the physical property of the Tempe Canal, were finally consolidated into the Salt River Project. That consolidation, while a benefit for the Tempe farmers and the Project as a whole, was unfortunate for a historian of the canal, for in eliminating the separateness, the contrariness and the contention between the two organizations, the identity of the Tempe Canal was lost. It became part of the Southside Irrigation Division of the Project, and its Wormser and Kyrene extensions were incorporated into the existing parallel canals. As Tempe became increasingly urbanized, the original Hayden and Western branches, which dated from the early 1870s, were both reduced to laterals and began to disappear into underground pipes. Soon the term "Tempe Canal" referred only to the main canal from the Tempe Crosscut to the junction with the Western Canal.

#### Rehabilitation and Betterment

Following the end of the Second World War, the Salt River Project participated in a federal loan program to

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<sup>46</sup>Opinion and Decision, E.C. Adams v. SRVWUA (Maricopa County Superior Court, 1937).

rebuild and modernize its irrigation delivery system. The "Rehabilitation and Betterment" (R&B) program included concrete lining of canals and laterals, underground piping of some laterals, and replacement of earthen and wooden headgates and control structures with concrete and steel components. These measures saved water loss due to seepage and weed growth, reduced erosion, and improved the regulation and measurement of water delivery. In addition, underground piping of laterals improved the safety and traffic flow of an increasingly urbanized area. An example of the type of changes brought by the R&B program may still be seen on the Hayden Ditch (now Lateral Five). East of McClintock Drive (photo AZ-16-16) the ditch runs through a concrete slip-formed ditch of a type very typical to the R&B program. After being piped for several hundred yards, the water emerges into a broad and shallow unlined ditch (photo AZ-16-15) not very different from that originally dug by the pioneer shareholders in 1871.

The R&B program and other improvements by SRP's Water Construction and Maintenance division also sought to increase efficiency of water delivery by improving the routing and operation of the system. A good example of the combined effect of these improvements was found on the lower reaches of the Hayden Branch of the Tempe Canal. This was the most historic section of the canal, which had provided water for hydropower generation at Hayden Mill, and supplied water to the San Francisco Canal. But while hydro

generation at the mill ended in 1924, the canal still ran behind the mill and along the south bank of the Salt River for approximately three miles before reaching any farm gates. Besides representing a large loss of water through seepage and plant growth along the sandy river bank, this section of the canal was frequently used by Project zanjeros as a handy waste ditch to dump excess water into the riverbed. By eliminating this ditch, Project engineers hoped to eliminate the seepage losses, avoid further maintenance on the Hayden tailrace, and make use of the water being dumped into the river bed by the zanjeros (see photo AZ-16-18).

To accomplish this, the Hayden Branch was eliminated north of a point known as continuation gate 70, at about Fifth Street and College, in downtown Tempe. Those lands in north Tempe which relied on the Hayden Branch would continue to be served by the lateral which ran more or less down Fifth Street to 52nd Street. Laterals 6 and 7 of the Western Canal were expanded to carry water north to the south Phoenix lands formerly served by the Hayden Branch. At the same time, these laterals were converted to underground pipe. The saving of water in eliminating this section of the Hayden Canal, combined with the savings of losses due to seepage and evaporation in laterals 6 and 7,

was estimated to amount to 8,825 acre feet of water per year.<sup>47</sup>

### Canals and the Urban Landscape

As Phoenix and its suburbs (including Tempe) grew, more and more of the farmland within the Project was converted to residential neighborhoods. These lands still had water rights, however, and many homes, schools and parks continued to receive flood irrigation through Project canals and laterals. Urban irrigation has given large areas of the valley a distinctive landscape comprised of ditches, standpipes, ditch gates and bermed lawns. Of course, the most imposing structures are the canals and large laterals. As the urban area grew, the streets and blocks, with their rectilinear orientation, ran up against the canals, which were oriented to the slope of the land. The canals were not only physical barriers, but legal ones, since their right of ways were owned by the federal government. Therefore the layout of streets and neighborhoods was forced, in most cases, to conform to that of the canal system where they met (the Tempe Canal is also the border between Tempe and Mesa from University Avenue to the Western Canal). The series of aerial photographs (AZ-16-20 through AZ-16-23) shows how this process affected some parts of Tempe as of 1988. And

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<sup>47</sup>"A Report of the Survey of the Hayden Canal," September 5, 1956, SRPA Control 2462.

though many ditches have been abandoned or piped underground, SRP has long had a policy of retaining ownership of canal and ditch right of ways, whenever possible, for future use. This has created subtle aberrations in the urban landscape. Two examples of this are found in the Tempe system.

The Western Branch of the canal, dating from about 1872, ran only through farmland until the mid-1960s, when the southward expansion of Tempe reached and passed it. From 1965 to 1974 most of this canal, now known as Lateral Six, was piped in conjunction with the development of residential subdivisions in the neighborhood. Although no longer visible, the Western Branch left a permanent imprint on the development of the city, because the streets to the north of the ditch, such as Concorda and Broadmor, had already been laid out parallel to the ditch (see photos AZ-16-21, AZ-16-23). SRP continued to retain ownership of the right of way, which can be seen from the surface as a grassy median running down the middle of Alameda Drive, and as unusually wide alleys along the route of the ditch (see photo AZ-16-17). The Hayden Ditch is similarly marked along its piped sections by set-back buildings and wide sidewalks and streets.

Another remnant of the Tempe Canal which is still visible in the layout of urban development is the old Trunk Ditch, which was superseded by the Tempe Crosscut in 1895 as the main delivery canal for the Tempe system. Though seldom



used thereafter, the Trunk Ditch was maintained by the Tempe Canal Company until its purchase by the Water Users' Association, and continued to be represented on canal maps up to that time. It was clearly visible in the 1934 aerial photograph of Section 9, T1N, R5E (photo AZ-16-20) and the covered-over section north of the Mesa Country Club is still visible from the air in the 1988 aerial (photo AZ-16-22). This section of the right of way is still used by SRP as a piped pump ditch which feeds into the Tempe Canal below Chandler Falls (photo AZ-16-19). The original headworks in the river have apparantly been covered by a landfill.

While the alignment of Alameda Drive and other streets was an example of the city conforming to the canal system, there have also been cases when the irrigation system was changed to conform to urban development. An example of this was Dobson Ranch, a 1,600 acre planned development just east of the Tempe Canal, which approached the Project in 1971 to consolidate the water rights and water delivery of all the land in the development to create a system of lakes as its centerpiece. The initial proposal was to reroute the Tempe Canal and divide and curve it in picturesque ways. SRP rejected this plan but eventually approved an alternate plan by which the development diverted approximately 700 inches of water at a single point on the Tempe Canal to supply the lakes. SRP refused to accept and credit return water from the lakes, because of the fear of setting an unworkable

precedent in crediting return flow. The water is lost through seepage and evaporation and replaced as needed.<sup>48</sup>

#### Realignment of the Tempe Canal

While SRP declined to relocate the canal for the Dobson Ranch development, it was realigned in 1977 because of the construction of the Superstition Freeway. SRP originally hoped to run the canal under the freeway along the same alignment, but ended up routing it approximately one half mile due west, then running across the freeway in a flume with service roads on both sides (photo AZ-16-12).<sup>49</sup>

In 1989, work began on another realignment and piping of the same section of the canal. This was necessitated by the planned construction of the Price Freeway, which will overlap the Tempe Canal right of way for approximately two miles, from the Western Canal to the Superstition Freeway. The canal will go underground on the north side of the Superstition in two ten foot diameter pipes, crossing under both the Superstition and Price freeways and running south under the west access road of the Price before spilling into the Western Canal. This was the first time a long stretch of a major SRP canal had been piped, and it eliminated the

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<sup>48</sup>Agreement Between SRVWUA, Transamerica Insurance Company et al, February 22, 1973 (SRP Secretary's Office).

<sup>49</sup>Arizona Department of Transportation, Public Notice, State Route 360, Superstition Freeway, Price Road-Dobson Road, n.d., SRPA.

flume over the Superstition Freeway (see Appendix I and photo AZ-16-13).

### Conclusions

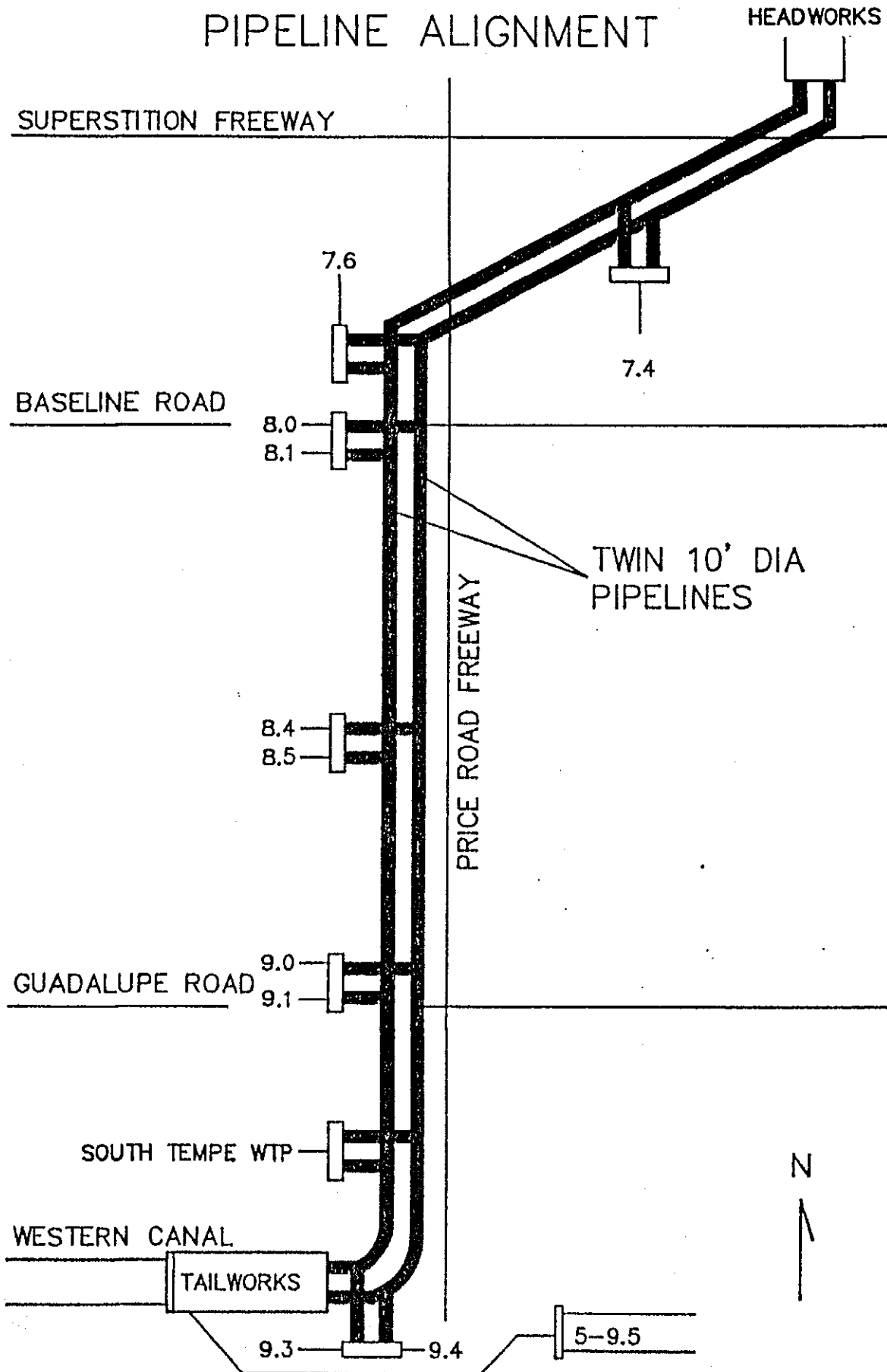
The Tempe Canal is the oldest canal in the Salt River Valley in continuous use. The oldest part of the main canal still in use is the reach below Chandler Falls which runs through sections 9, 16 and 17 (T1N, R5E). This part of the canal dates from the spring of 1871. Ironically, this is one of the few sections on the upper reaches of the canal which still ran past farm fields in 1989 (photo AZ-16-9). The Hayden, or McKinney-Kirkland ditch, which in one place runs between Hayden Lane and Kirkland Lane in Tempe, is largely piped, but still open ditch in some small sections, and remnants of the abandoned tail race are still visible along the north bank of the Salt River in 1989 (photo AZ-16-18). This reach, the first extension of the Trunk Ditch, dates from no later than 1872, and is now a supply source for urban irrigation in north Tempe. The Western Branch, which also dates from 1872, is now entirely piped and supplies urban irrigation to central Tempe. The Southern Branch dates from the early 1880s, and is the branch which is today known as the Tempe Canal. This branch has been the location of most of the innovation in the system in recent years, having been relocated and flumed, and now scheduled to be piped under the Price Freeway. Another innovation in this section was its status as the

first southside canal to use biological weed control. From Chandler Falls to its junction with the Western Canal, the Tempe Canal is stocked with Triploid White Amur, or grass carp, a weed-eating fish which has replaced chemical control of aquatic weeds in this area. The Kyrene and Wormser extensions of the Southern Branch are also still in use, now as extensions of the Western Canal. The use of the Tempe Canal for hydropower, which began with the Hayden Mill in 1874, came to an end with the closing of the Chandler Falls hydroelectric plant in 1952. SRP and other firms have periodically considered low-head hydro generation at this site, but have so far been unable to justify the expense of a new plant for such a small generating capacity. One possible future for the Tempe Canal is as part of a canal-side recreational development which could be promoted by a city or a private party. This would perhaps be similar to such recreational uses being developed on the Arizona Canal in Scottsdale and Phoenix. Thus, while unimaginable to the pioneers who dug the canal and built and rebuilt the dam, and to the farmers, lawyers and businessmen who stubbornly held out against all perceived threats to their water rights and investment, the Tempe Canal survives today as a distinctive and important feature of the urban landscape, and there is every reason to believe that it will still be flowing in its course long after more transitory features of the city have disappeared.

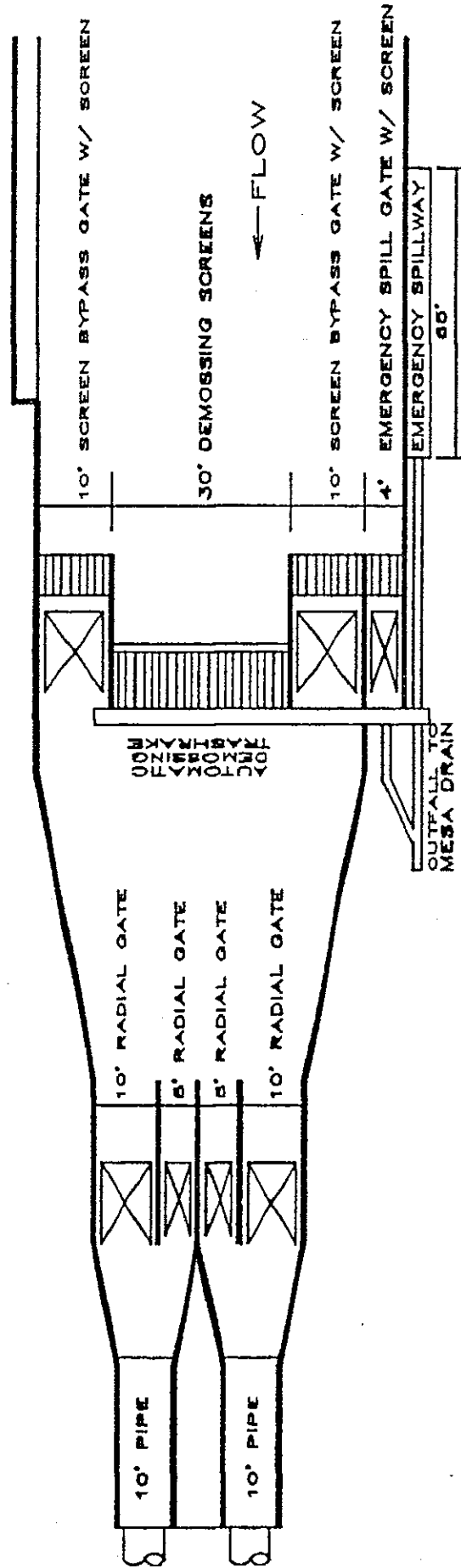
APPENDIX 1

Tempe Canal Relocation,  
1988 Plans and Drawings

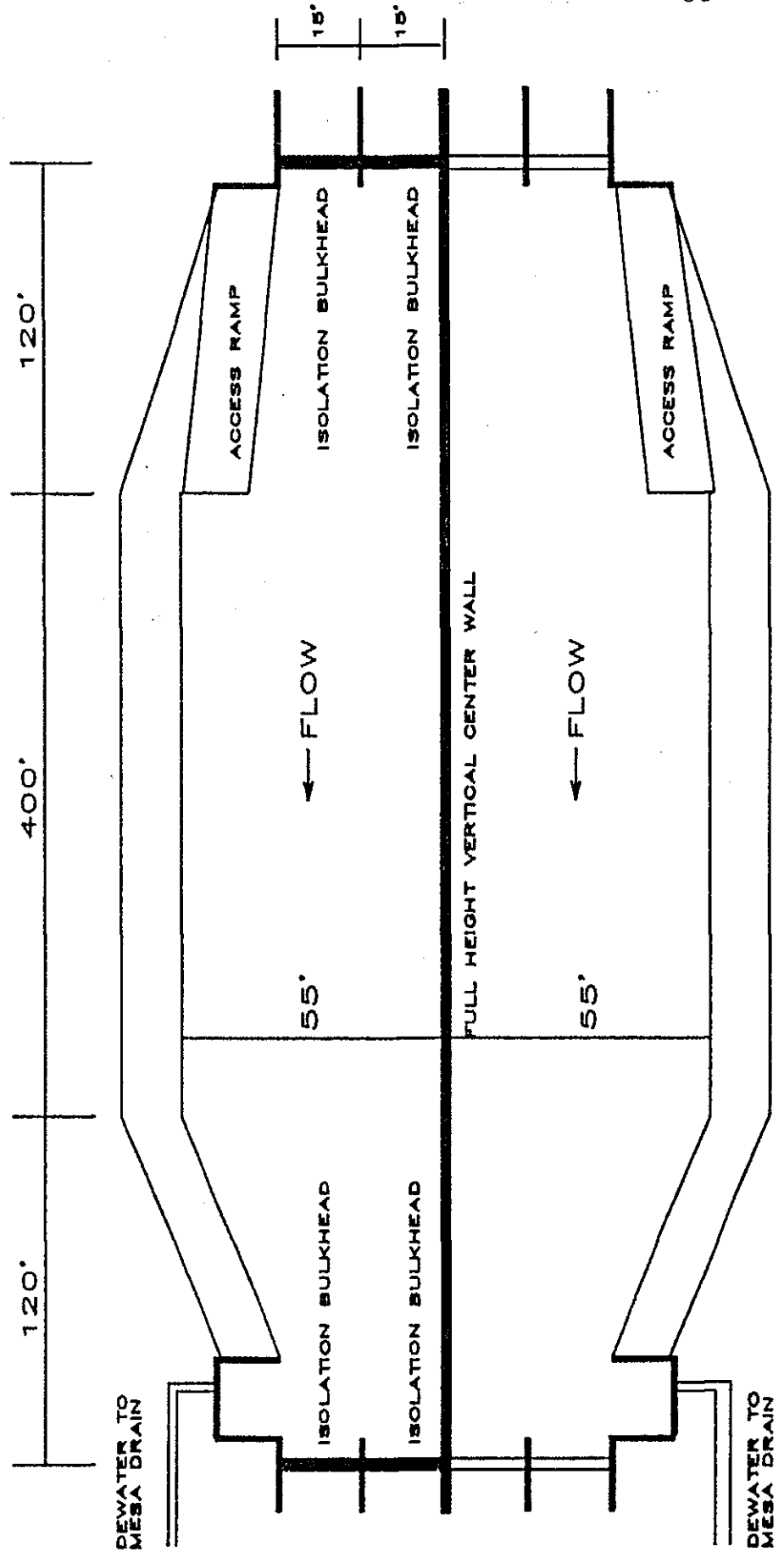
# TEMPE CANAL RELOCATION PIPELINE ALIGNMENT



# TEMPE CANAL RELOCATION HEADWORKS CONFIGURATION

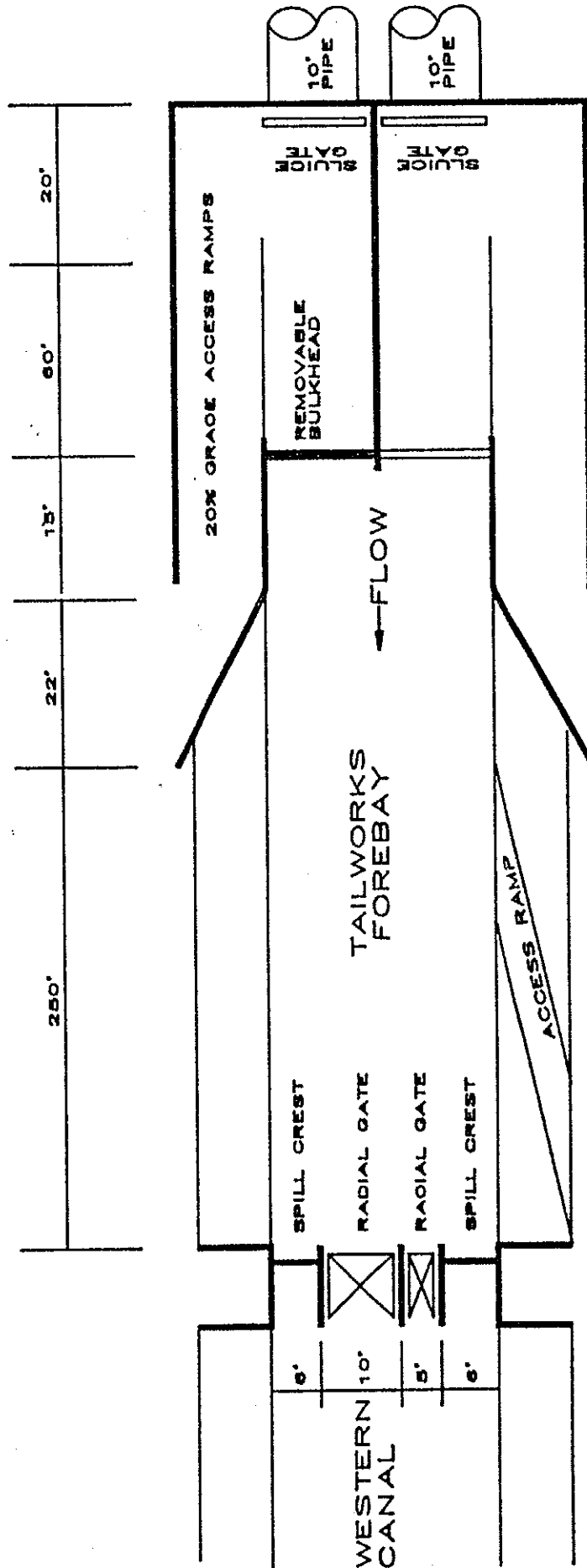


# TEMPE CANAL RELOCATION SEDIMENTATION BASIN





# TEMPE CANAL RELOCATION TAILWORKS CONFIGURATION





# SALT RIVER PROJECT

## CANAL IMPROVEMENTS

PRICE FREEWAY TEMPE CANAL RELOCATION

ENGINEERING FILE NO. RT-70234

DESIGN ENGINEER: GERRY BASTIAN TEL. 236-5805

DEC 21 1988

F.N.W.	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	1011 W 50			
PHOENIX, ARIZONA					

## LEGEND

## PLAN SYMBOLS

- BENCHMARK
- SECTION CORNER
- SURVEY POINT (CALL OUT)
- SECTION LINE
- CONSTRUCTION BASE LINE
- PROPERTY OR R/W LINE
- EASEMENT LINE
- EXIST DITCH
- EXIST IRRIG PIPE (SIZE & TYPE)
- EXIST IRRIG HOWL OR HOWL/TRRK
- EXIST FIRE HYDRANT
- EXIST WATER VALVE
- EXIST WATER (WATER-W / GAS-G)
- EXIST WATER LINE
- EXIST SOWER LINE
- EXIST GAS LINE
- EXIST TELEPHONE (DUCT OR CABLE)
- EXIST U.G. ELEC. (DUCT OR CABLE)
- EXIST MANHOLE (NON WUA)
- EXIST STORM DRAIN
- EXIST CATCH BASIN
- EXIST UTILITY POLE
- EXIST DOWN SUEY
- EXIST FENCE (WOOD)
- EXIST FENCE (WIRE/NOT SPECIFIED)
- EXIST TREE (GIVE TYPE)
- EXIST STUMP
- EXIST MAIL BOX

## GENERAL NOTES

THE S. R. P. DOES NOT GUARANTEE THE LOCATION OR ELEV. OF UTILITIES AND WILL NOT BE RESPONSIBLE FOR THEIR RELOCATION.

PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL CONTACT BLUESTAKE (263-1100) TO LOCATE AND FLAG ALL EXISTING UNDERGROUND UTILITIES.

FACILITIES WHICH ARE NOT SPECIFICALLY LOCATED WITH ACTUAL HORIZONTAL AND VERTICAL CONTROLS ARE LOCATED ONLY APPROXIMATELY AND TO THE BEST AVAILABLE KNOWLEDGE.

VERTICAL CONTROLS ARE BASED ON SEA-LEVEL DATUM AS DEFINED BY THE BENCHMARK ON EACH PLAN-PROFILE.

CONDS SHOWN ON THE PLAN-PROFILE ARC ALONG THE PIPELINE CONTROL CENTERLINE.

UNLESS OTHERWISE NOTED.

ALL EXISTING IRRIGATION FACILITIES DISTURBED BY NEW CONSTRUCTION SHALL BE RECONSTRUCTED TO CURRENT S. R. P. STANDARDS.

ALL WORK AND MATERIALS THAT DO NOT CONFORM TO THESE PLANS, AND SPECIFICATIONS ARE SUBJECT TO REMOVAL AND REPLACEMENT AT THE CONTRACTOR'S EXPENSE.

ALL STAKING CONTROLS SHALL BE LEFT UNOBTAINED. THE CONTRACTOR SHALL NOTIFY THE S. R. P. ENGINEER TO REFERENCE AND RESET ANY CONTROL POINTS THAT HAVE TO BE OBTAINED. THE CONTRACTOR WILL BE CHARGED FOR RESTAKING IF ANY STAKES ARE DESTROYED.

ALL CONSTRUCTION WATER AND POWER SHALL BE OBTAINED AND HANDLED BY THE CONTRACTOR AT HIS OWN EXPENSE. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL EXISTING AND NEW TRANSPORT WATER TO THE CONSTRUCTION SITE. ALL TEMPORARY FACILITIES SHALL BE REMOVED PRIOR TO FINAL ACCEPTANCE BY S. R. P.

THE CONTRACTOR IS RESPONSIBLE TO ASSURE THAT ALL WORK IS PERFORMED IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL SAFETY REGULATIONS.

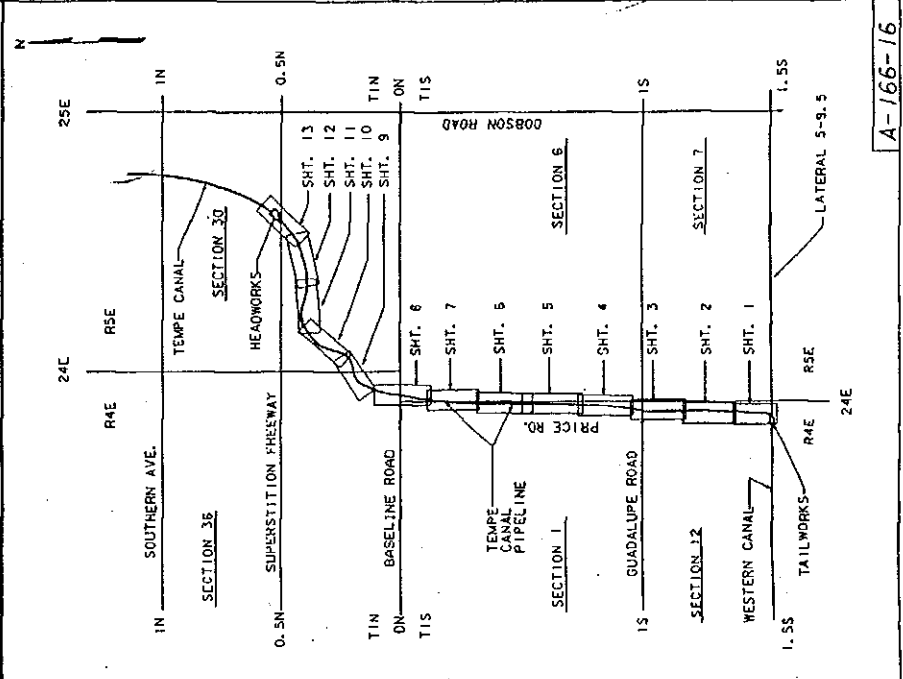
LATERAL CONNECTION LOCATIONS ARE STATIONED ON CONTROL LINE OF PIPELINE WITH LATERAL CONNECTION TO RIGHT PIPE AND LOOKING FORWARD ALONG ALIGNMENT FROM STATION.

TYPICAL DETAILS FOR EXCAVATION BEDDING AND BACKFILL IS SHOWN ON A-166-17.

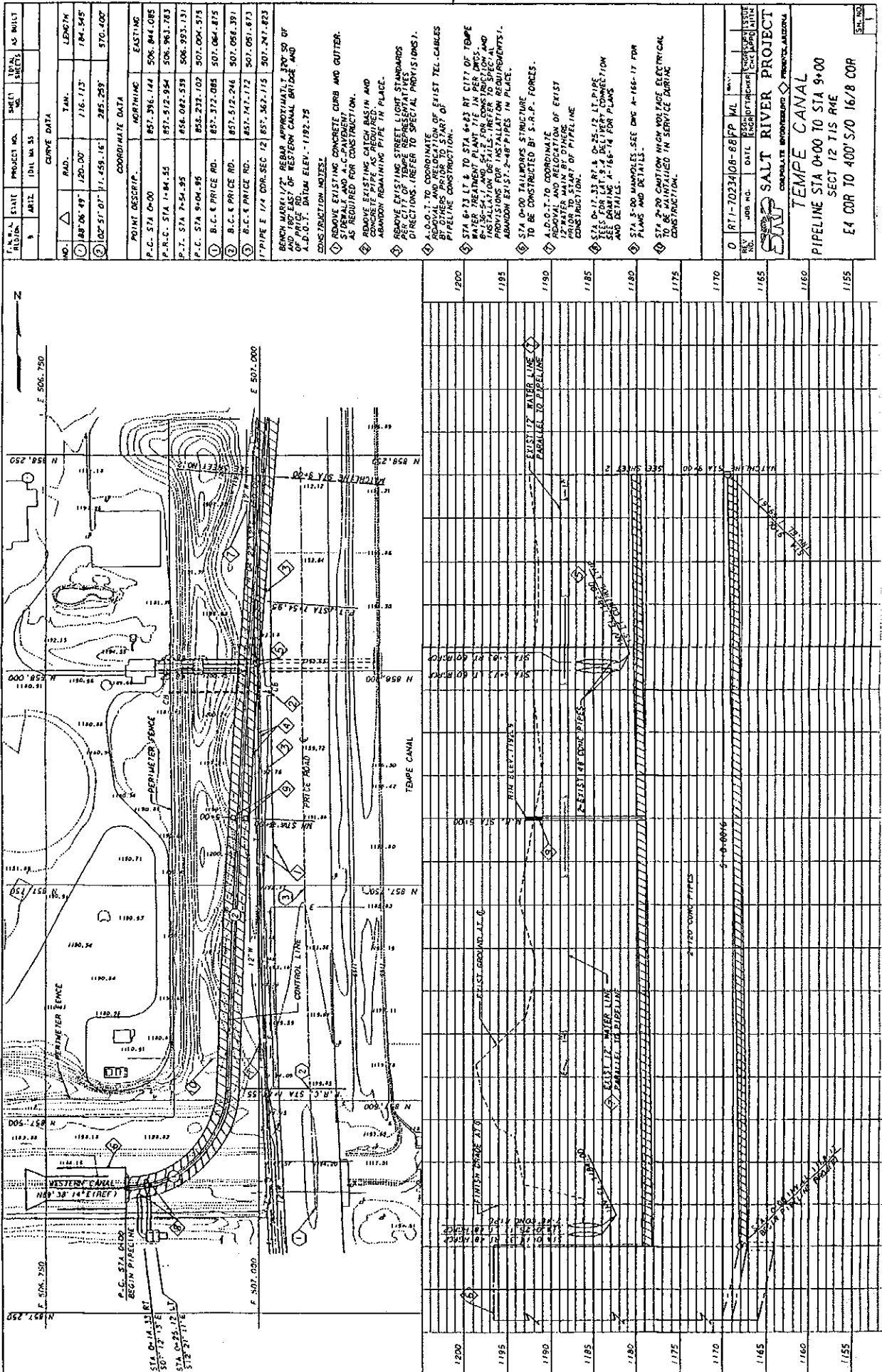
## PLAN INDEX

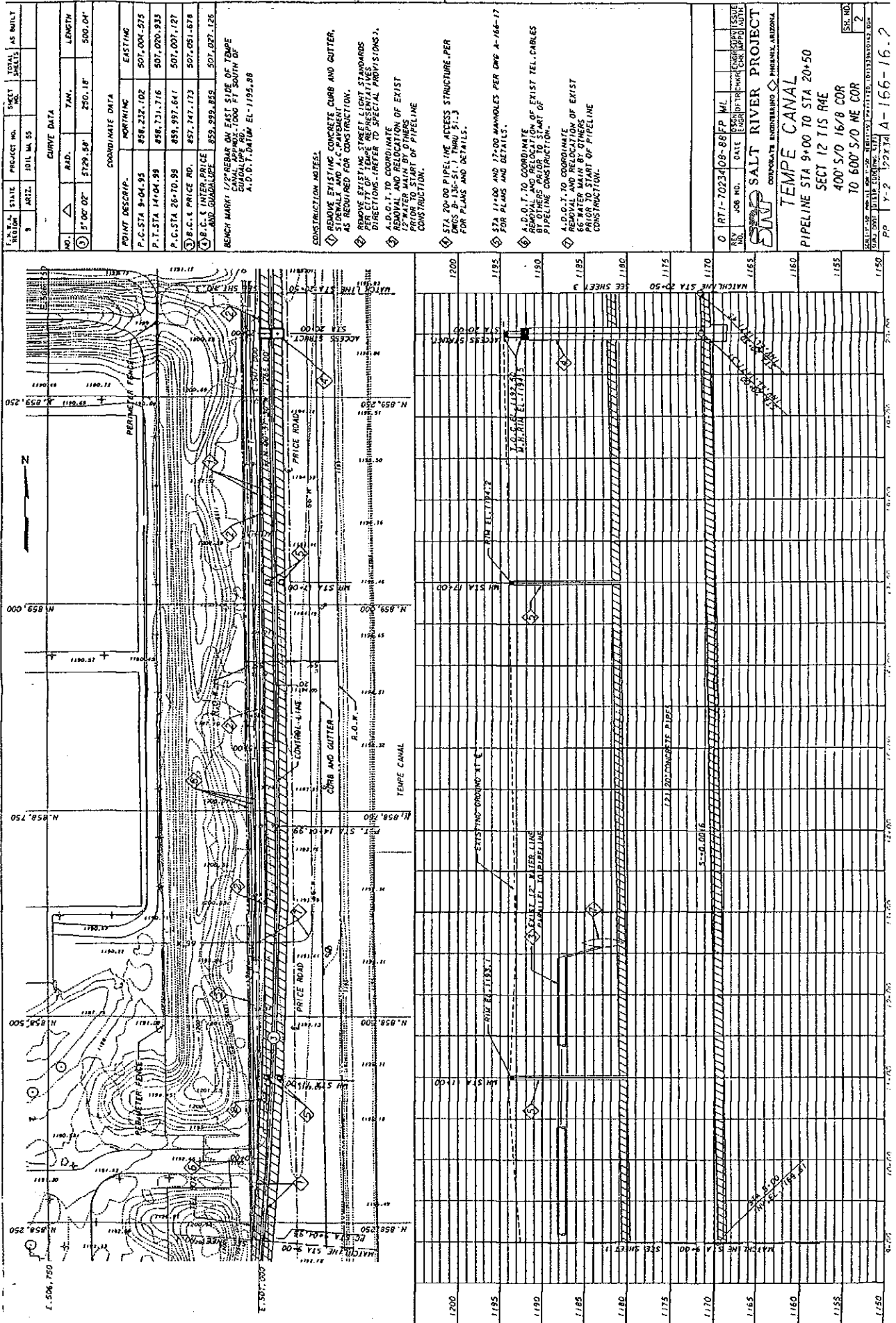
PLAN DESCRIPTION	DWG. & SHT. NO.
PIPELINE PLAN-PROFILE	
STA 0+00 TO 9+00	A-166-16.1 SHT. 1
STA 9+00 TO 20+50	A-166-16.2 SHT. 2
STA 20+50 TO 31+50	A-166-16.3 SHT. 3
STA 31+50 TO 42+50	A-166-16.4 SHT. 4
STA 42+50 TO 54+00	A-166-16.5 SHT. 5
STA 54+00 TO 65+50	A-166-16.6 SHT. 6
STA 65+50 TO 76+50	A-166-16.7 SHT. 7
STA 76+50 TO 88+50	A-166-16.8 SHT. 8
STA 88+50 TO 99+00	A-166-16.9 SHT. 9
STA 99+00 TO 110+00	A-166-16.10 SHT. 10
STA 110+00 TO 121+50	A-166-16.11 SHT. 11
STA 121+50 TO 130+50	A-166-16.12 SHT. 12
STA 130+50 TO 137+33.13	A-166-16.13 SHT. 13
MISC. PIPELINE DETAILS	A-166-17 SHT. 14
ACCESS STRUCT. W/BURIED TOP	
PLAN & DETAILS	B-136-51.1 SHT. 15
SECTIONS & DETAILS	B-136-51.2 SHT. 16
BULKHEAD PLAN	
SECTIONS & DETAILS	B-136-51.3 SHT. 17
ACCESS STRUCT. W/OPEN TOP	
PLAN & DETAILS	B-136-52.1 SHT. 18
SECTIONS & DETAILS	B-136-52.2 SHT. 19
DEWATERING STRUCTURE	
PLAN & SECTIONS	B-136-53.1 SHT. 20
SECTIONS & DETAILS	B-136-53.2 SHT. 21
SECTIONS & DETAILS	B-136-53.3 SHT. 22
TEMP. WTP SERVICE CONNECTION STRUCTURE	
PLAN & DETAILS	B-136-54.1 SHT. 23
SECTIONS & DETAILS	B-136-54.2 SHT. 24

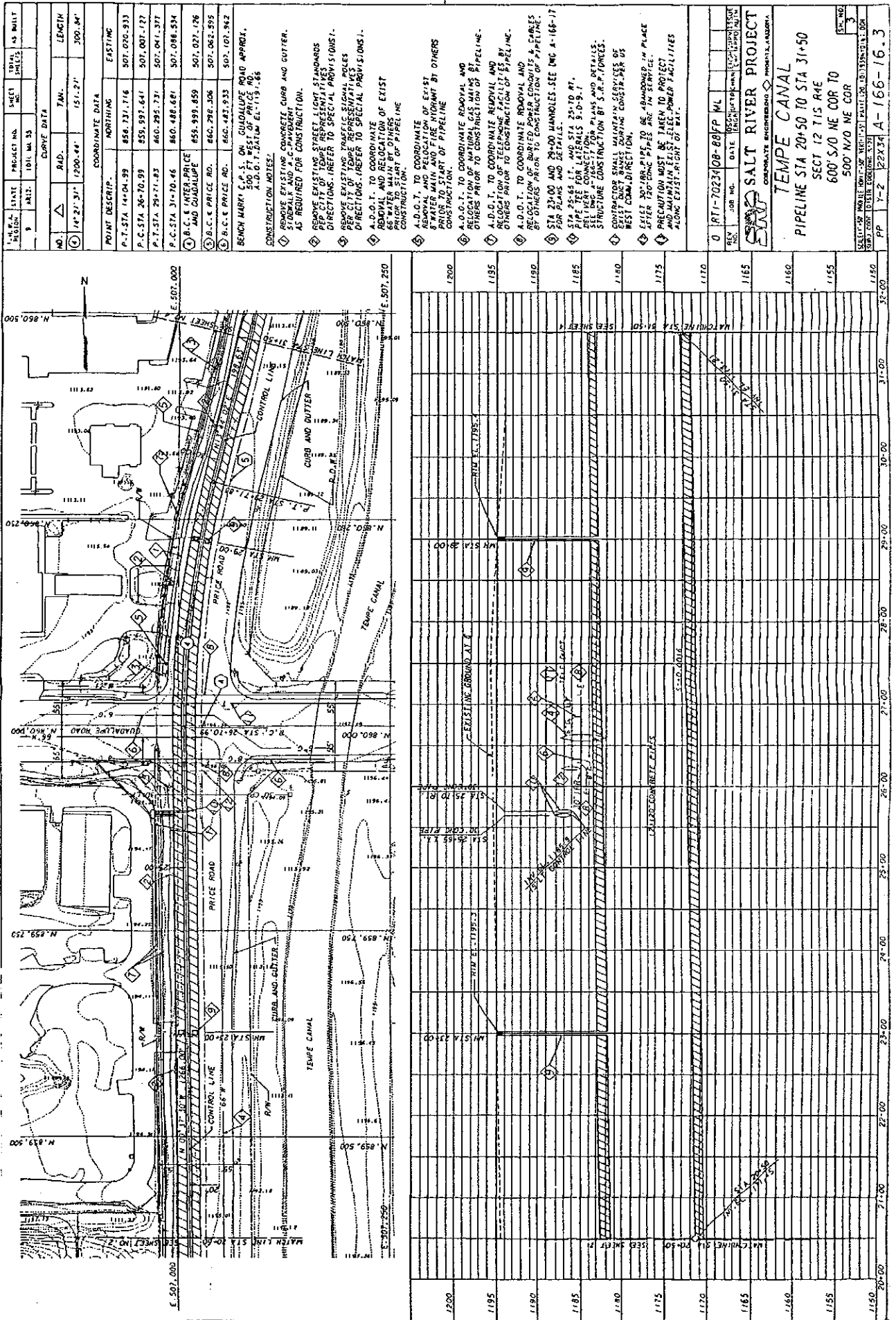
## KEY PLAN

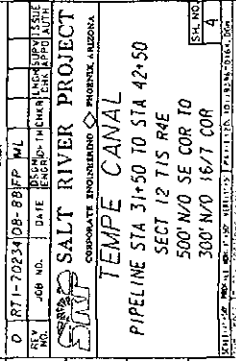


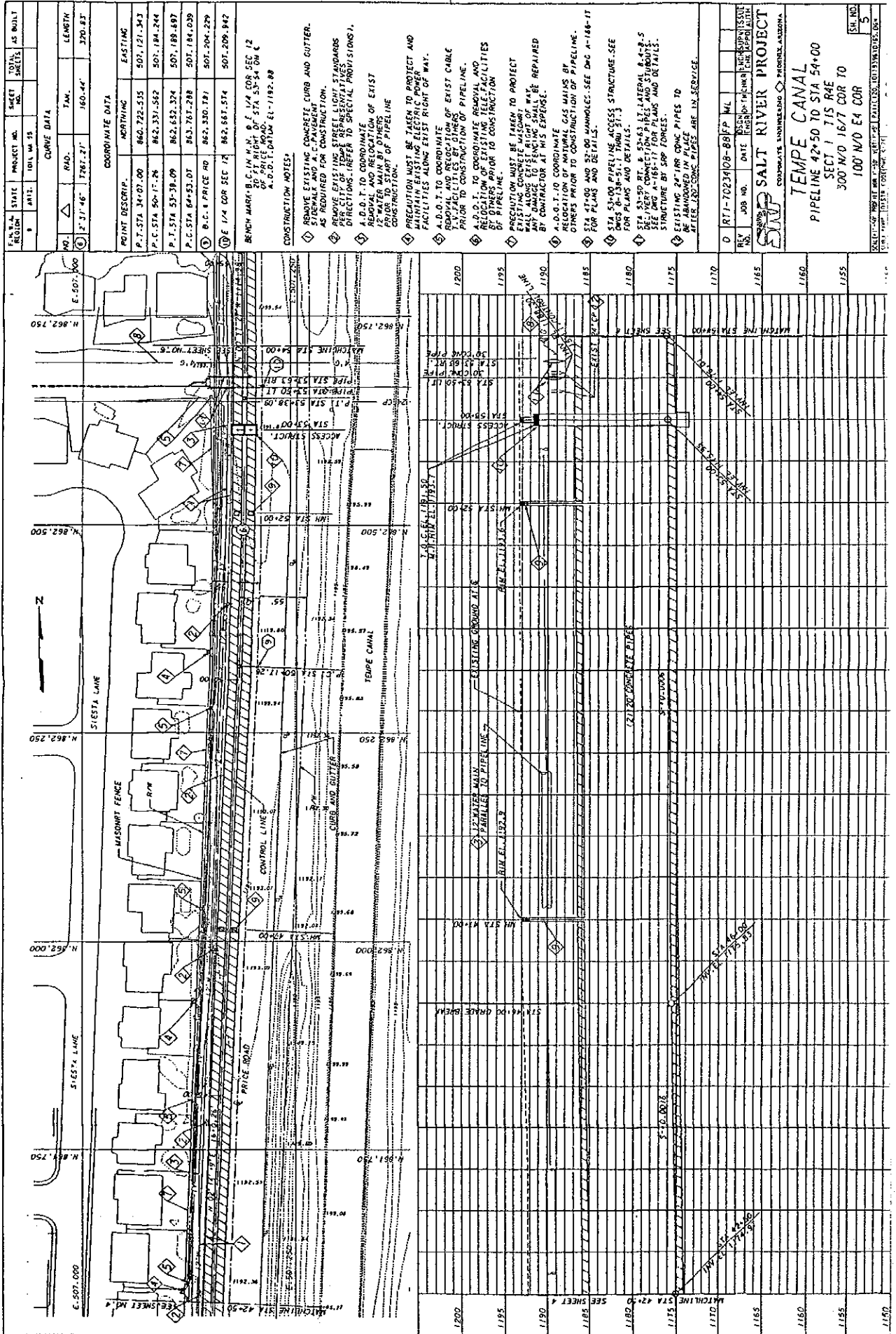
A-166-16

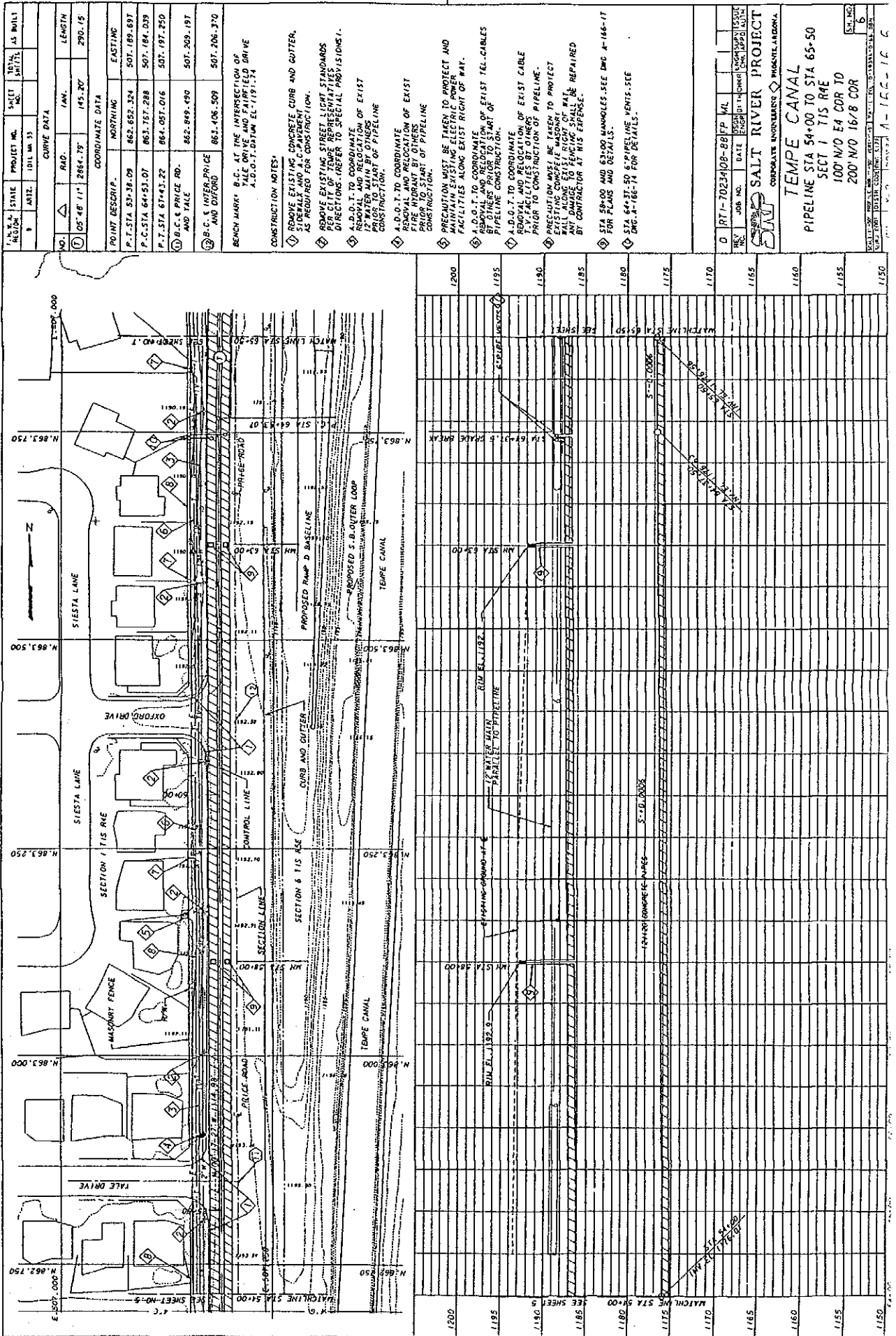












NO.	Δ	RAD.	ANG.	LENGTH
1	05° 48' 11"	2884.79'	145.20'	290.15'

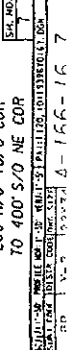
POINT	DESCRIP.	NORTHING	EASTING
P.T. STA 53+38.09		862.652.324	507.189.697
P.C. STA 64+53.07		863.757.288	507.184.339
P.T. STA 67+43.22		864.057.016	507.197.250
B.C. & PRICE RD. AND TAIL		862.849.490	507.209.197
B.C. & INTER-PRICE AND DUFFORD		863.405.509	507.206.370

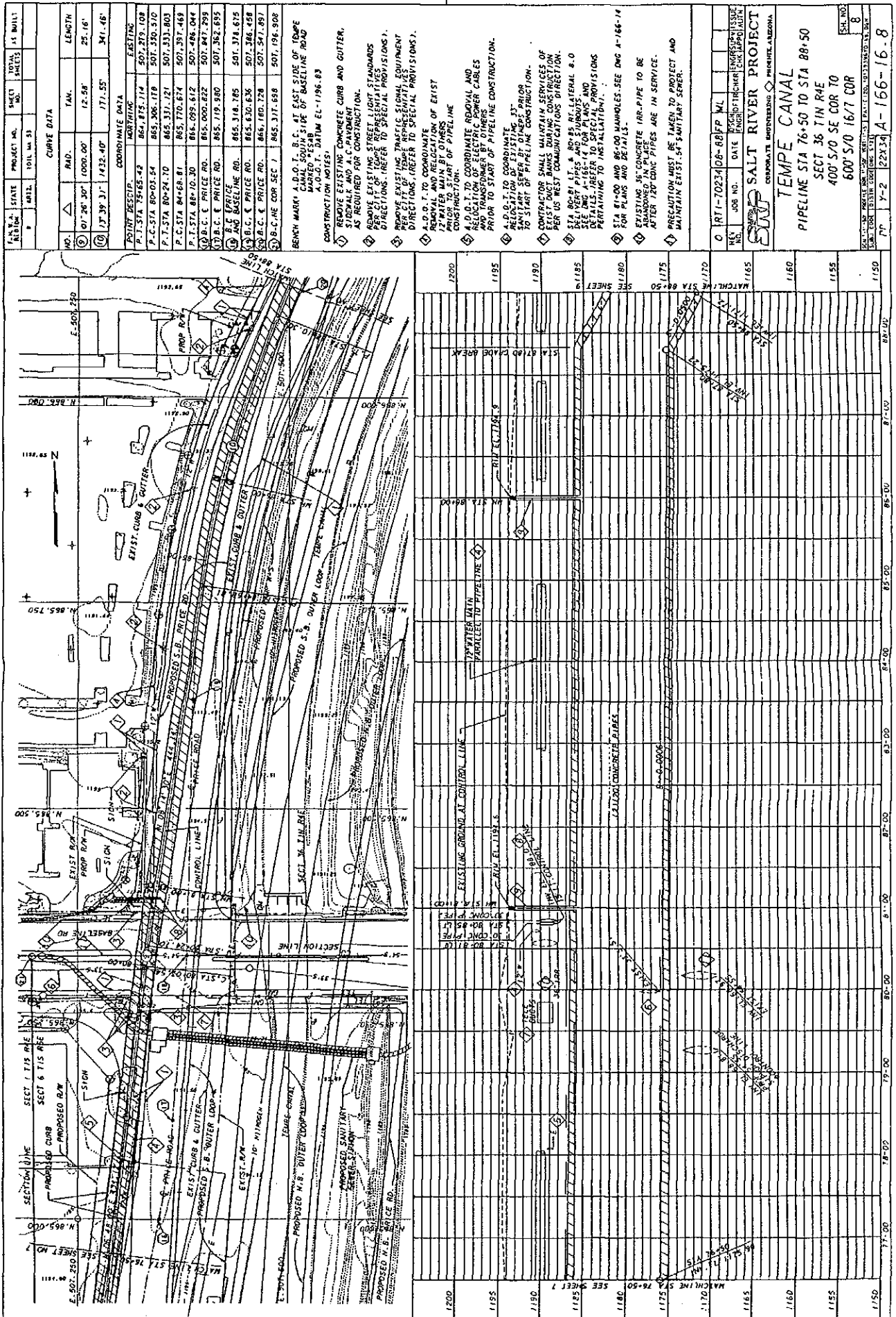
BENCH MARK  
B.C. AT THE INTERSECTION OF  
PRICE RD. AND DUFFORD DRIVE  
A.S.C. 17.05 M EL. 119.274

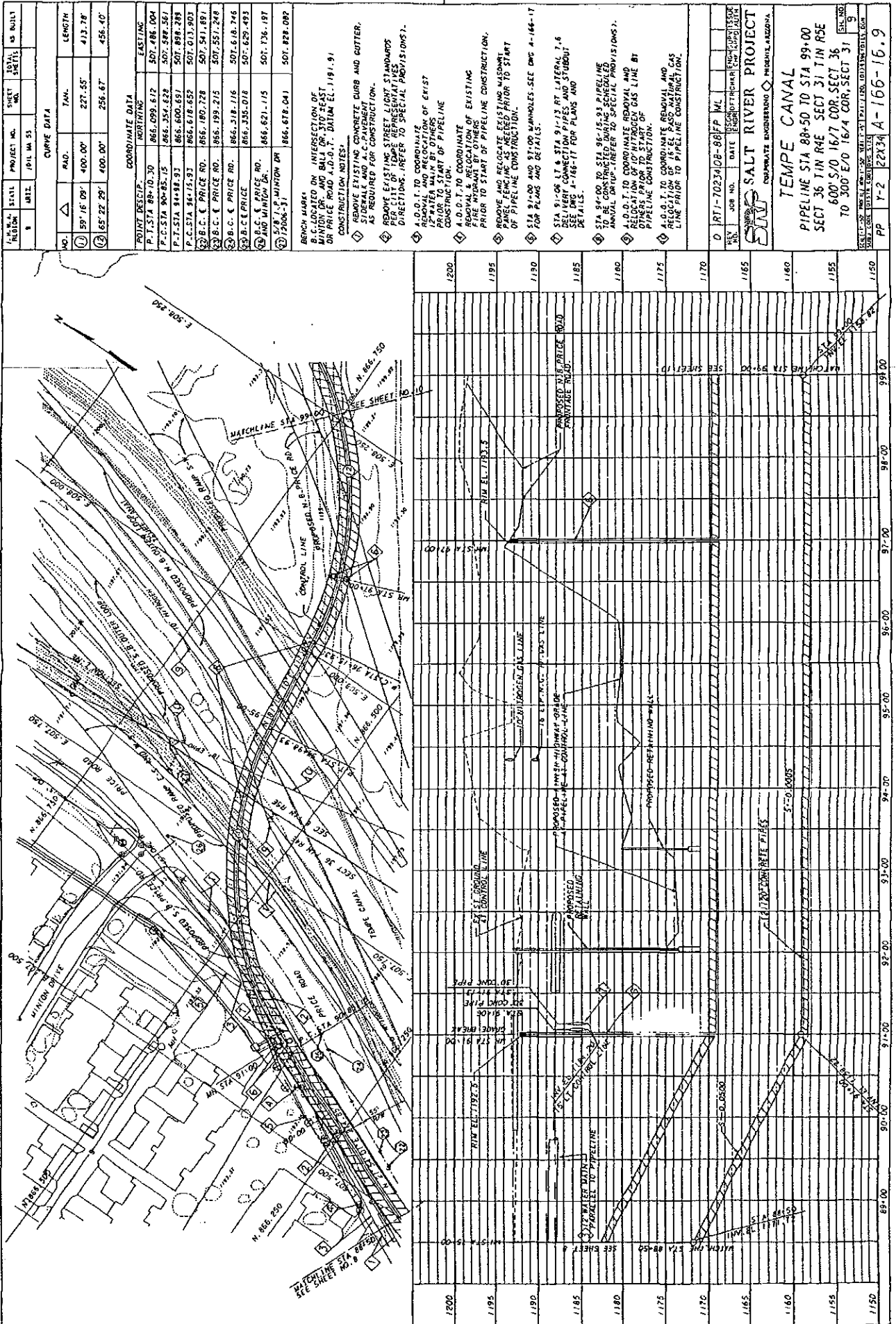
- CONSTRUCTION NOTES:
- REMOVE EXISTING CONCRETE CURB AND GUTTER, AS REQUIRED FOR CONSTRUCTION.
  - REMOVE EXISTING STREET LIGHT STANDARDS PER CITY OF TEMPE REPRESENTATIVES. DIRECTIONS: REFER TO SPECIAL PROVISIONS 1.
  - A.D.O.-T. TO COORDINATE REMOVAL AND RELOCATION OF EXISTING STREET LIGHT STANDARDS PRIOR TO START OF PIPELINE CONSTRUCTION.
  - A.D.O.-T. TO COORDINATE REMOVAL AND RELOCATION OF EXISTING FIRE HYDRANT BY OTHERS PRIOR TO START OF PIPELINE CONSTRUCTION.
  - PRECAUTION MUST BE TAKEN TO PROTECT AND MAINTAIN EXISTING ELECTRIC POWER FACILITIES ALONG EXIST RIGHT OF WAY.
  - A.D.O.-T. TO COORDINATE REMOVAL AND RELOCATION OF EXISTING TELEPHONE FACILITIES ALONG EXIST RIGHT OF WAY.
  - A.D.O.-T. TO COORDINATE REMOVAL AND RELOCATION OF EXISTING T.V. FACILITIES BY OTHERS PRIOR TO CONSTRUCTION OF PIPELINE.
  - PRECAUTION MUST BE TAKEN TO PROTECT AND MAINTAIN EXISTING RIGHT OF WAY DAMAGE TO FENCING SHALL BE REPAIRED BY CONTRACTOR AT HIS EXPENSE.
  - STA 54+00 AND 57+00 MANHOLES SEE DWG A-166-17 FOR PLANS AND DETAILS.
  - STA 64+37.50 6" PIPELINE VENTS SEE DWG A-166-14 FOR DETAILS.

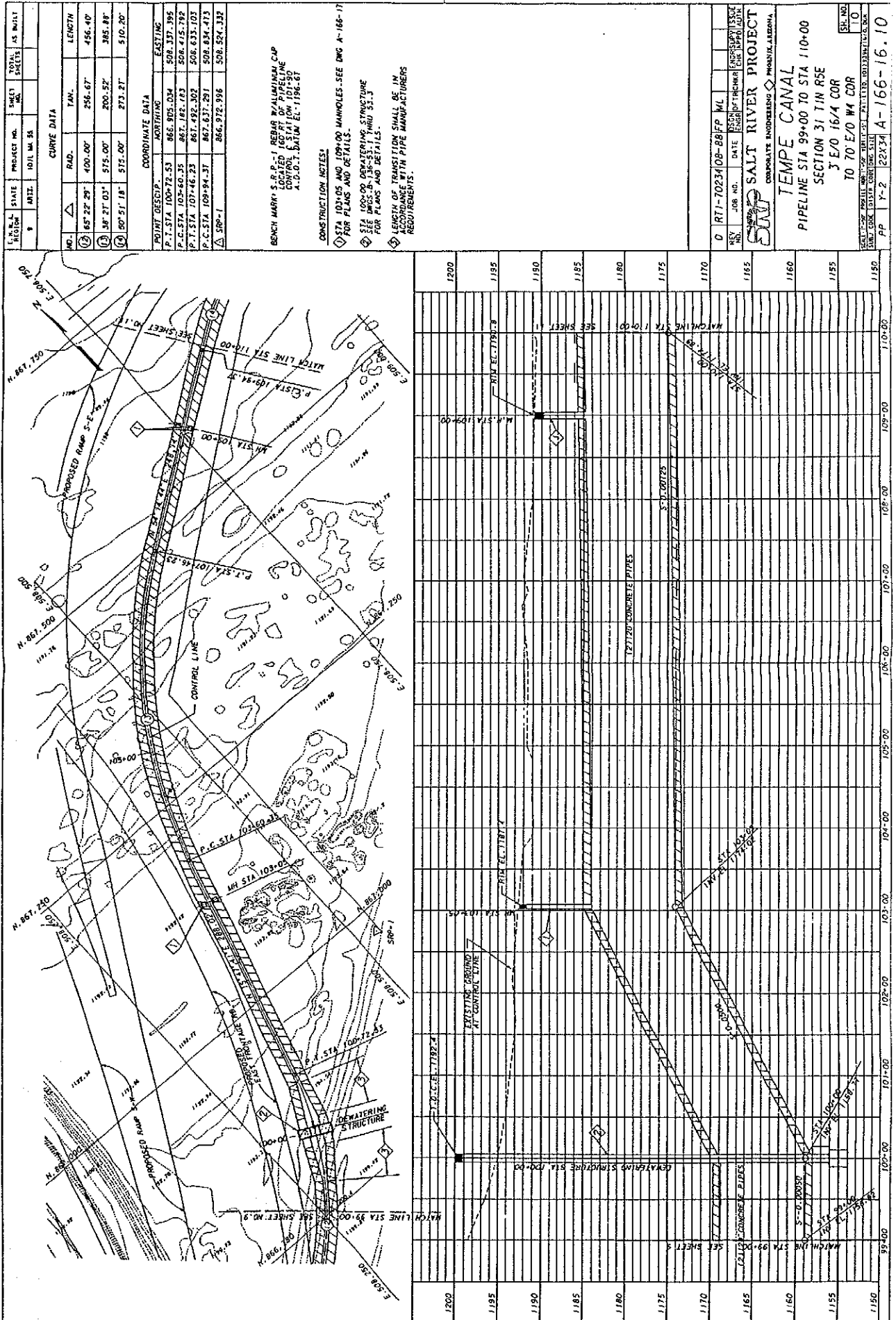
PROJECT NO.	171-7023408-28	DATE	10/1/77
STATE	ARIZ.	JOB NO.	171-7023408-28
SECTION	1	DATE	10/1/77
SALT RIVER PROJECT			
CORPORATE ENGINEER: PHOENIX, ARIZONA			
TEMPE CANAL			
PIPELINE STA 54+00 TO STA 65+50			
SECTION 1 TIS RIE			
100' N/O E4 COR TO			
200' N/O 16/8 COR			
SHEET NO. 6			
TOTAL OF SHEETS: 6			
DRAWN BY: J. L. BROWN			
CHECKED BY: J. L. BROWN			
APPROVED BY: J. L. BROWN			

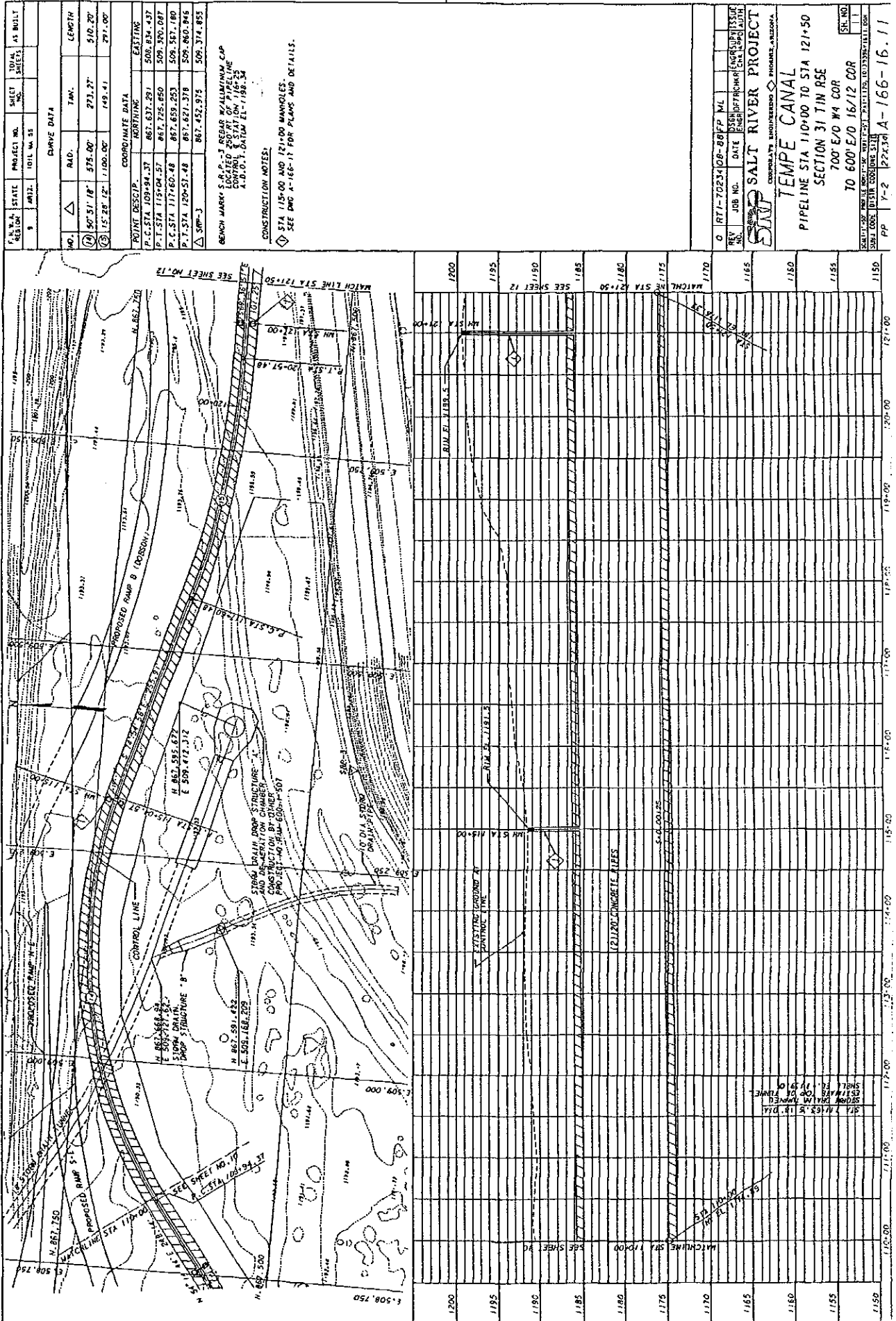


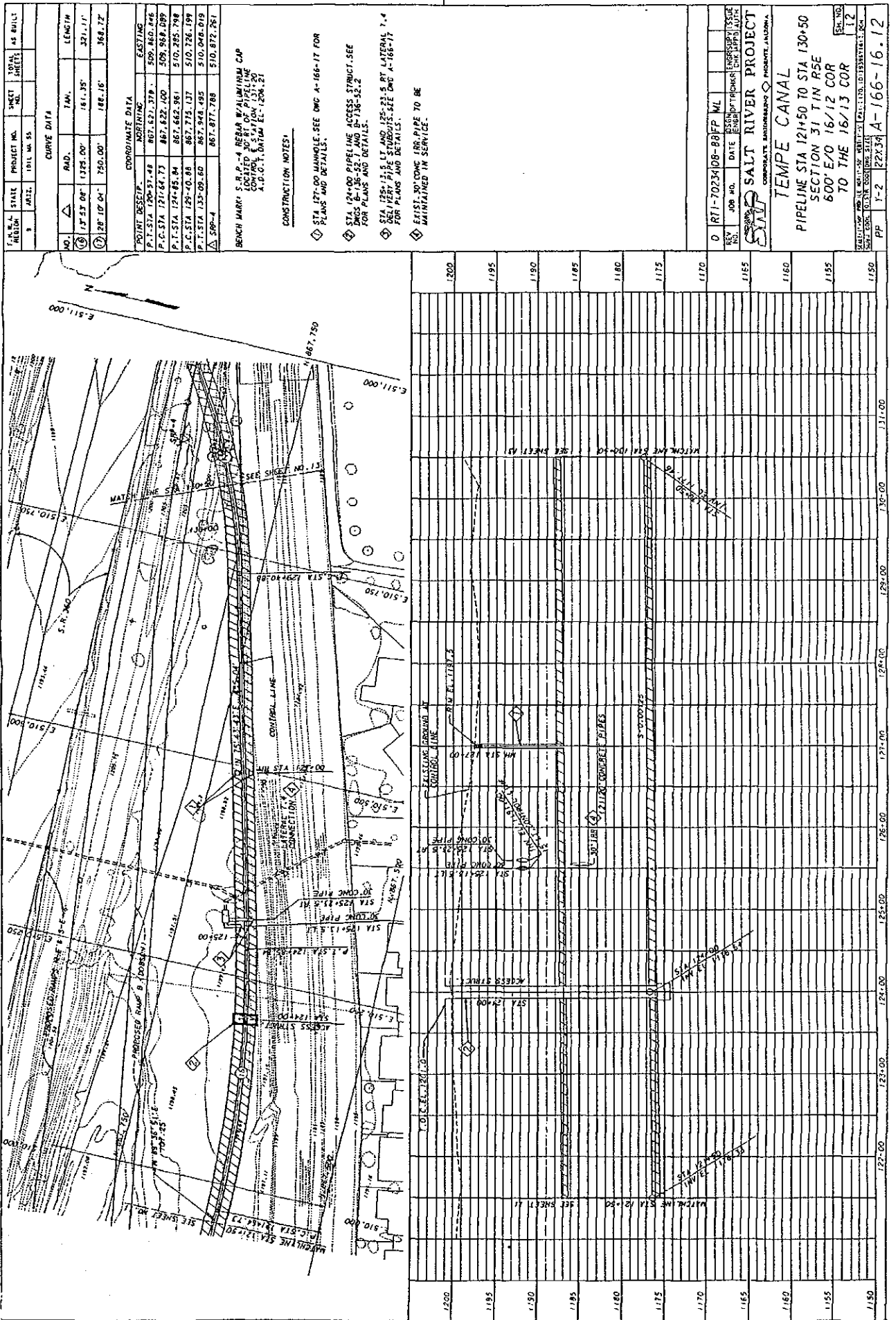




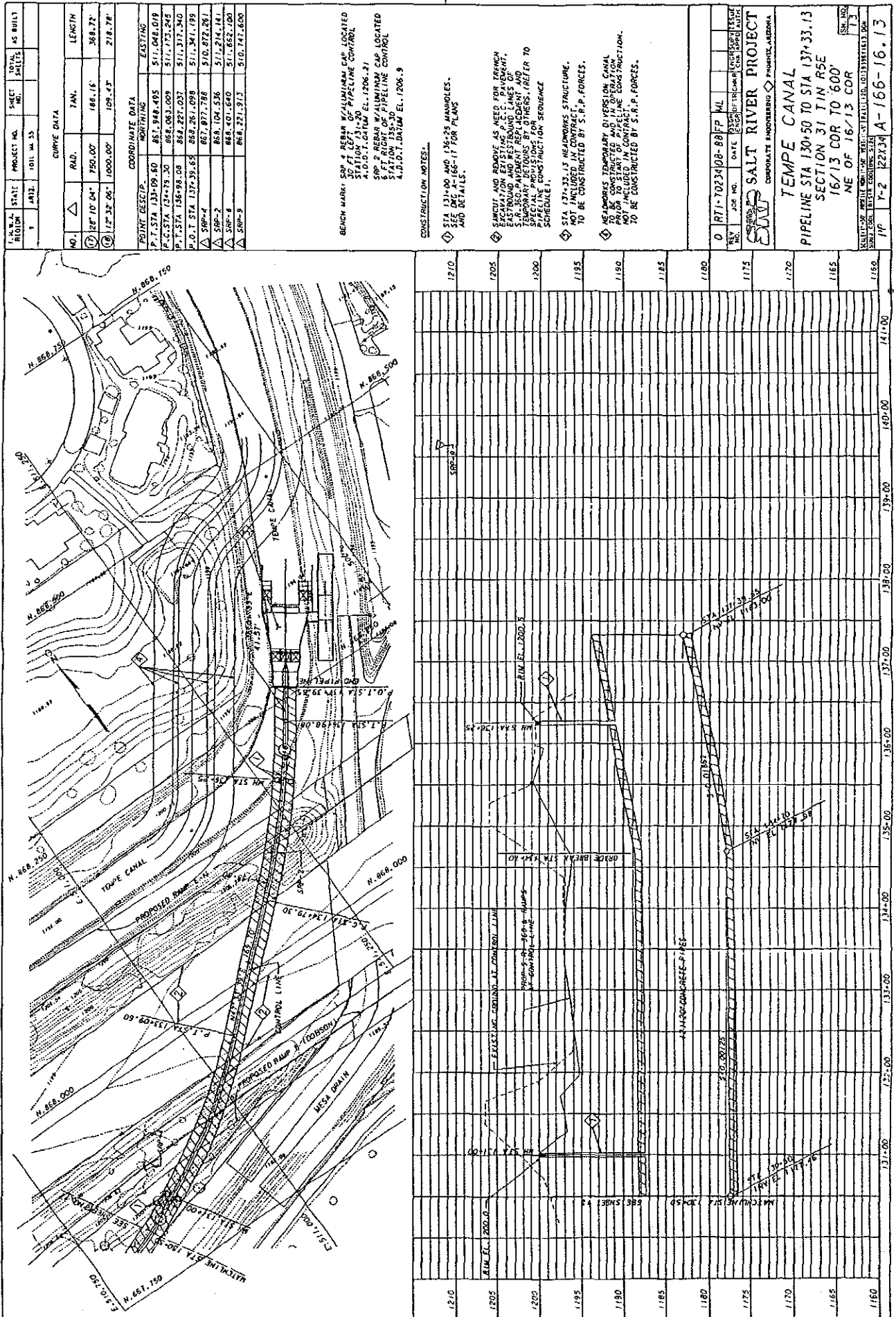












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\_\_\_\_\_. Tempe Historical Society.

\_\_\_\_\_. Salt River Project. Project Secretary's Office.

\_\_\_\_\_. \_\_\_\_\_. Research Archives.

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Arizona Gazette.

Arizona Republican.

Mesa Free Press.

Phoenix Enterprise.

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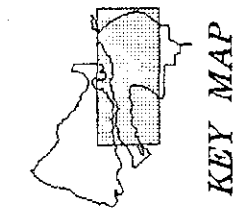
District Court of the Second Judicial District, Arizona Territory. M. Wormser et al. v. Salt River Valley Canal Company, no. 704, 1892.

District Court of the Third Judicial District, Arizona Territory. Hurley v. Abbott, no. 4564, 1910.

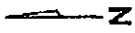
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\_\_\_\_\_. "Salt River Valley Canals: 1867-1875." Paper presented at Salt River Project, 1980.



SCALE  
0 2 4 MILES



# CANALS OF THE SALT RIVER VALLEY (PAST & PRESENT)



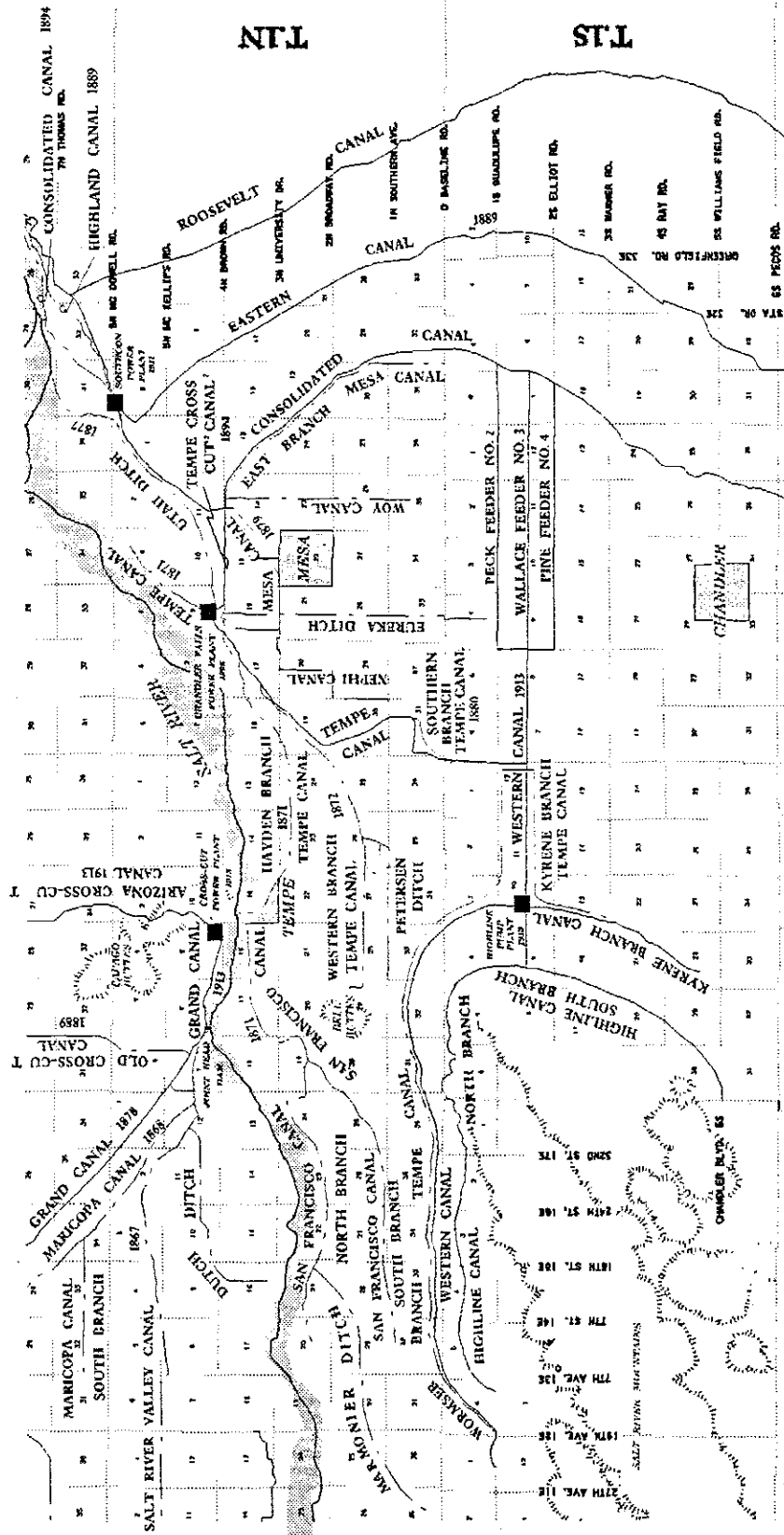
## LEGEND

HISTORICAL CANAL

EXISTING CANAL

POWER PLANT/

PUMPING PLANT



R.3E

R.4E

R.5E

R.6E